

# **Graduate Student Handbook**

**2013-2014**

**Montana State University - Bozeman  
Department of Microbiology**

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## **INTRODUCTION**

This handbook has been written so that each graduate student in this department may have a copy of the policies and procedures of the Department of Microbiology that affect the Graduate Programs. Microbiology students who are affiliated with other research units on or off campus (e.g., Center for Biofilm Engineering, McLaughlin Research Institute for Biomedical Research, National Institutes of Health Rocky Mountain Lab) must also abide by these policies and procedures.

We have attempted to answer the most frequently asked questions. The policies and procedures of The Graduate School are detailed on their MSU website. The information in this *Graduate Student Handbook* is consistent with the latest version of the catalog. Both documents are subject to revision and students are encouraged to obtain current information from the Departmental Office, Academic Coordinator or from the Graduate Program Committee Chairperson.

The Graduate Program Committee, appointed by the Head of the Department, is responsible for administration of the Microbiology Graduate Program. Apparent conflicts in procedures should be resolved by first consulting the chairperson of the Graduate Program Committee, then the Department Head, and finally the Dean of The Graduate School.

The requirements outlined in this manual should be considered minimal and may be modified by the student's Graduate Committee according to the student's need. Students entering the graduate program must meet the requirements of The Graduate School and the requirements of the Department of Microbiology contained in this *Graduate Student Handbook*.

*Although students are expected to put forth the necessary commitment and effort to progress at a satisfactory pace, a graduate degree from this Department is not granted solely on the basis of time spent. Rather, our goal is to assist each graduate student to attain competence in a chosen field. Mastery of an area in Microbiology is a difficult task but the rewards are substantial. We believe the effort is worthwhile.*

## **THE DEPARTMENT OF MICROBIOLOGY OFFICE**

The Office of the Department of Microbiology is located in Room 109 Lewis Hall. The office staff is always pleased to welcome students and to try to help them solve problems. Graduate students should consider the Departmental Office as the focus of information and official action on campus. The office is open from 8:00 AM to 12:00 Noon and from 1:00 PM to 5:00 PM, Mondays through Fridays. The office is not accessible at other times.

Please consult the MSU Department of Microbiology website for more information.

### **Addresses and Telephone Numbers**

The office maintains an up-to-date list of addresses (physical and email), and telephone numbers of faculty, staff, and students. Each student must provide the office staff with such information as soon as possible and keep the office informed of any changes.

### **Bulletin Board**

Notices of seminars, special events, fellowships, assistantships and employment opportunities are posted on the bulletin boards in the hall outside the main office and on the first and second floors of Cooley Lab.

### **Mail**

Graduate students are assigned mailbox space in Lewis Hall, Room 109. Special notices, telephone messages and letters received in care of the Department are placed in the mailbox. Students should check daily to ensure prompt receipt of this material.

### **Computer Services**

Computers in the main office are for Departmental business. Graduate students have access to computers in Lewis Hall Rooms 105 and 211. Generally, graduate students also have access to computer facilities in the laboratories of their major professor. The University supplies computer facilities for student use in Reid, Roberts and Cheever Hall as well as in the Renne Library.

### **Photocopy Policy**

The departmental photocopy machine is available to graduate students at the Department's expense only for copying related to teaching activities. Photocopying related to grant-funded activities should be billed to one of your advisor's accounts. Other photocopying will be billed to you at a rate established by the department.

### **FAX**

A FAX is available in the Department office. The number is 406-994-4926.

### **Poster Printing**

The office houses a printer capable of printing large format posters for presentation of your research. Please make arrangements with the office staff ahead of time to have your poster printed as it can get quite busy at times.

**PERSONNEL MENTIONED IN THIS HANDBOOK**

**Head, Dept. of Microbiology**

Matthew Fields

**Microbiology Graduate Curriculum Committee**

Mensur Dlakic, chair

Matthew Fields

Kari Cargill

**Dean, The Graduate School**

Ron Larsen (Interim Dean)

**Microbiology Graduate Student Representative**

Luis Serrano

(Chosen from current graduate students to attend Departmental faculty meetings and meetings of the Graduate Curriculum Committee.)

## **ADMISSION TO GRADUATE STUDY**

### **General Statement of Policy**

Inquiries concerning graduate study in the Department of Microbiology are referred to the Chair of the Departmental Graduate Program Committee and evaluated by appropriate faculty members. Students accepted for the Master of Science or the Doctor of Philosophy degree programs in the Department of Microbiology must conform to the requirements and regulations of The Graduate School and to those of the Department of Microbiology. The Department of Microbiology and the student's Graduate Committee will specify additional requirements for the degree. All of these requirements must be fulfilled before a student is awarded a degree from the University.

### **Application Requirements**

The procedures for admission are as stated in The Graduate School [Application Requirements](#). A brief outline is as follows:

1. **Application form**
2. **Three letters of recommendation**
3. **Graduate Record Examination (GRE)**

The Graduate Record Examination General Test must be taken prior to making an application for admission to The Graduate School. *No subject test is required* for the Department of Microbiology.

The result of the examination is one of the several criteria used to estimate a student's potential to succeed in graduate school. No minimum score is required by The Graduate School; however, a guideline which is used by the Department of Microbiology is a minimum combined score of 1150 on the verbal and quantitative portions of the examination.

4. **Official Transcripts**
5. **Cumulative Grade Point Calculation form**
6. **Application fee**
7. **Personal Statement**

### **Additional materials required from International Applicants:**

#### **8. English Proficiency exams**

If English is not the official language of the student's country of citizenship, the student is required to take either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). These exams are not required if the applicant has received an undergraduate or graduate degree from an institution in the U.S.

For the **TOEFL**, The Graduate School requires a minimum of

- 550 (paper-based test)
- 213 (computer-based test)

- 80 (internet-based test) The Graduate School requires a minimum of 580 for the written version of the TOEFEL and a 237 on the computer version to qualify for a graduate teaching assistantship.

For the **IELTS**, The Graduate School requires a 7.0 minimum band score.

## 9. International Student Financial Certificate

**\*\*For students wishing to qualify for a Graduate Teaching Assistantship (GTA),**  
The Graduate School requires:

- a minimum GRE verbal score of 480

International Students wishing to act as a GTA must also have:

- minimum 237 (computer-based test) TOEFL score
- and a **TSE** (Test of Spoken English) or **SPEAK** (the institutional version of the TSE) exam before a teaching assistantship will be awarded. The TSE is offered by Educational Testing Service; the SPEAK is available at Montana State University. A passing grade of 50 must be achieved for either test.

### **APPLICATION and ADMISSION PROCESS**

The complete application packet for admission is available online at [Application for The Graduate School](#). At this website students may apply directly online, may print a paper copy of the application form or may write directly to the Department of Microbiology for an application packet. *The Department of Microbiology does not require a preliminary application.* Paper applications may be sent to:

Graduate Program Coordinator  
Department of Microbiology  
P.O. Box 173520  
Montana State University  
Bozeman, MT 59717-3520

The Department of Microbiology has set **deadlines** by which complete applications must be received for consideration. These are:

- for Fall Semester
  - February 1 for Early Admission
  - March 15 for Regular Admission
- for Spring Semester
  - September 15

After receipt of the completed application, the Department of Microbiology Graduate Committee and faculty will review the application and make an initial recommendation. The Department Head will then make a firm recommendation to the Vice Provost of The Graduate School concerning admission to the Department. The Vice Provost will make the final decision on the application.



The Department may choose any of the following:

- **Accept (Regular Admission).** The student has satisfied all of the requirements of The Graduate School and those of the Department of Microbiology. The GRE scores indicate a high probability of success in graduate school. The academic record and recommendations of the student meet the standards established by the Department. A mentor in the student's area of interest is likely to be available.
- **Accept with Provisions (Provisional Admission).** Many provisions are possible and no attempt will be made here to list all possible provisions. Rather, a few examples are given. A provision may be that the student is admitted to a specific program, e.g., Master of Science - option B. In other cases, the provision may be that a student must take certain courses to correct deficiencies in undergraduate preparation.
- **Refuse.** Admission may be refused because: (i) the record of the student does not meet the desired standards; (ii) the potential for success in graduate school is considered to be doubtful; (iii) the Department may have more students than the faculty can reasonably guide; (iv) the Department cannot support the research of the student; or (v) a mentor in the student's area of interest is unavailable.

If you are accepted by The Graduate School, you must fill out and return the Admissions Response form, stating whether or not you intend to attend Montana State University.

## **GENERAL DEPARTMENTAL REQUIREMENTS**

- **New Student Orientation**

Prior to the first week of the semester the department holds an orientation for all new graduate students. This will entail an overview of our graduate program.

Students should wait to determine their final class selections until they have had this orientation.

- **Participation in the annual Departmental Retreat**

The Department holds a retreat in late August to promote intradepartmental exchange for all faculty, staff and graduate students. All graduate students are expected to attend and participate.

- **Teaching Experience**

All graduate students are expected to teach, or to assist in teaching, an undergraduate course for at least two semesters (for PhD students) or one semester (for MS students). The goal is to provide an important professional experience for the student.

A Teaching Assistant (TA) workload is considered to be 20 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.

TA tuition waivers, covered by the department, cover only tuition costs and not associated university fees.

- **Departmental Seminar Presentation**

All graduate students are required to formally present their research **annually** to the faculty in the Departmental Seminar. Please consult with the faculty member in charge of the seminar, prior to or early in, the semester in which you would like to present.

- **Annual Committee Meetings**

The student's Graduate Committee meets with the student annually (at a minimum) to monitor progress towards the degree.

- **Printed copies of thesis/dissertation**

Hardbound copies of Thesis/dissertation, labeled on the spine with the student's name and thesis title, must be supplied to the major professor and to the Microbiology Department.

## **CREDIT GUIDELINES**

The regulations of The Graduate School with respect to registration are found at [Credit Guidelines](#). Important considerations are:

- **Tuition waivers**
  - If the student is on a fellowship, traineeship, or assistantship, s/he must be registered for at least six credits each semester to be eligible for tuition waivers.
  - Please note that tuition waivers do not cover associated university fees. These must be paid by the student or by their major faculty member.
  
- **Graduate Teaching or Research Assistants (GTAs/GRAs)**
  - Students employed as GTA's and GRA's pay in-state tuition rates.
  
  - GRA's are limited by The Graduate School to no more than 12 credits per semester if working more than 15 hours per week. GRA's who are appointed to fewer than 15 hours per week may carry up to 15 credits per semester. Special permission is required to take more than 15 credits.
  
  - Our TA's are appointed to a 20 hour per week workload (class time, preparation and grading included).
  
- **International Students**

International students must register for at least nine credits each semester.
  
- **Financial Aid**

Usually requires 6 credits per semester.
  
- **Montana residency**
  - Out-of-state students wishing to become Montana residents must begin a process that takes a full 12 months. During that time they may not take more than 6 credits per semester in order to qualify for resident tuition rates. Students are encouraged to obtain Montana residency as soon as possible in order to minimize tuition costs.
  
  - Consult this online site for [Residency Requirements](#)
  
  - **IMPORTANT:** toward the end of this period, a student must petition to be classified as a resident by submitting a questionnaire in the Board of Regents' Residency Policy Pamphlet (available from the Registrar's office or the Division of Graduate Studies office).
  
- **Continuous enrollment**

All graduate students who have passed their comprehensive exams or have completed their program coursework must be enrolled for a minimum of 3 credits of MB 590/690 while working on their thesis/dissertation.

- **Comprehensive exams, defense of thesis, graduation**  
Registration for at least three credits is required during the semester in which the student is taking oral examinations, defending a thesis/dissertation and also during the semester of graduation.
- **One credit final semester registration**  
A student who has completed all requirements for their degree (coursework, defense, approval of thesis/dissertation by the Vice Provost of DGE) on or before the day of the following semester may register for a minimum of 1 credit. This allows additional time past the intended semester of graduation but prior to the first day of the following semester. Graduation will officially be that following semester. Students who intend to do this should contact The Graduate School.

## **GRADUATE COMMITTEE**

- **Temporary Graduate Committee**

The Department Head assigns each new student a temporary committee of two faculty members with expertise in the student's area of interest. The temporary committee is responsible for planning the initial semesters of the student's study. One member of the temporary committee serves as the student's major professor until selection and appointment of the permanent Graduate Committee.

- **Permanent Graduate Committee**

The selection of a **major professor** is an important step in the process of graduate education. The student should have discussions with as many members in the Department as possible before making a decision. The decision must be based on an agreement between the student and the professor. The faculty member may reject a student if, for example:

- a. s/he has too many students, or,
- b. s/he has insufficient funds to support the research of the student, or,
- c. s/he judges that the student does not have the motivation, initiative, or ability to succeed.

After a student is accepted by a faculty member, the student is responsible to his/her major professor to perform in a satisfactory manner. *Failure to perform may result in dismissal from graduate school or in termination of work under the guidance and support of the major professor.*

The **permanent Graduate Committee** is appointed by the Dean of The Graduate School after receiving recommendations from the Department of Microbiology.

- The Graduate Committee for a **Master's** student consists of the major professor (chair) and two additional members.
- The Graduate Committee for a **Ph.D.** student consists of the major professor and a minimum of three additional members. An additional member (Graduate Representative) is appointed by the Vice Provost of The Graduate School.
- The majority of committee members must be from the Department of Microbiology.
- If the student pursues a **minor**, one member of the Graduate Committee must be from the Department offering the minor.

A student may have additional committee members although it is required that all members be present at all committee meetings and examinations. Keeping numbers low minimizes scheduling difficulties.

The composition of the Graduate Committee and the Graduate Program must be submitted on [Official Forms](#) to The Graduate School by the end of the second semester for Master's students and by the end of the third semester for Ph.D. students, which includes summer session.

All **changes** in the composition of the Graduate Committee must be submitted on [Official Forms](#) .

## **GRADUATE PROGRAM OF STUDY**

The general requirements of The Graduate School for Master's students can be accessed online at [Master's Students](#); and for PhD students at [PhD Students](#)

Graduate students must meet with their Graduate Committee and develop a Graduate Program. This Program of Study should be checked for errors and initialed by the Academic Coordinator. It can then be approved and signed by the student's Committee and the Department Head.

The Program must then be submitted to The Graduate School. Deadlines for this are:

- M.S. students – before the end of the second semester of study
- Ph.D. students – before the end of the third semester (including summer semester)

The Program is submitted on the [Graduate Program of Study and Committee Form](#) for approval by the Vice Provost of Graduate Education.

All **changes** in the composition of the Graduate Program must be submitted on [Official Forms](#) to The Graduate School.

Once a course has been taken, it cannot be removed from the Program.

Students in the Master's Plan A or the Ph.D. program are encouraged to complete as many course requirements as possible during the first year of matriculation to allow for more focus on research.

## **GRADUATE PROGRAMS IN MICROBIOLOGY**

### **Master of Science (Plan A)**

- **course credits**
  - A minimum of 30 credits is required for graduation of which 20 must be for course work and not thesis credit.
  - At least half of these 20 credits must be in the major subject area (MB).
  - A minimum of 10 thesis credits must be successfully completed.
  - Two-thirds of the minimum 30 credits must be at the 5XX-level. (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.
  - Course work more than 6 years old cannot be applied toward the program.
  - Transfer credits – see policy at [Transferring Credits](#)
- **pass-fail**  
No more than 3 credits taken on Pass/Fail basis may be applied to a M.S. program (aside from thesis credits).
- **Core curriculum**  
All M.S. students are required to take at least one course in **three** of the six areas of the core curriculum. The six areas of the core curriculum and the courses which can be used to satisfy the requirement are:

<b>core area</b>	<b>courses</b>	<b>to be offered</b>
Bioinformatics	MB 535 – Genomic Analysis (4 cr.) MB 537 – Advances in Molecular Evolution (3 cr.) MB 544 – Advanced Bioinformatics	Fall Fall Spring
Biochemistry	BCHM 543 – Proteins (3 cr.) BCHM 544 – Molecular Biology (3 cr.)	Fall alt odd yrs Spring alt odd
Immunology	MB 525 – Advanced Immunology (3 cr.)	Spring alt even
Microbial evolution & ecology	MB 515 – Advanced Microbial Ecology (3 cr.) MB 552 – Advanced Soil & Environmental Micro (3 cr.) ERTH 505 – Geomicrobiology	Spring alt odd Spring alt even Spring alt even
Microbial genetics & physiology	MB520 – Microbial Physiology MB 528 – Advanced Genetics (3 cr.) IMID 505 – Eukaryotic Gene Regulation (3 cr.) ENVE 566 – Fundamentals of Biofilm Engineering (3 cr.)	Fall Spring alt odd Spring alt odd Fall
Microbial pathogenesis & epidemiology	MB530 - Virology IMID 525 – Microbial Pathogenesis (4 cr) MEDS – Infectious Diseases and Microbiology (5 cr.)	Fall Fall Spring

\*Students who will be working with animals in their research are required to take MB 501- Principles and Techniques of Animal Experimentation

Courses required to fill each area of the core are likely to change as new courses are developed and approved by the Graduate Program Committee. Current course descriptions are available in the [MSU On-Line Catalog](#). Current course availability is found in the [MSU On-Line Schedule of Classes](#).

- **MB 500 seminars**

- All students are required to attend and participate in the **Departmental Seminar** (MB500 section 01) each semester in residence.

[Students who are also members of the Center for Biofilm Engineering will have the option of attending either the Departmental Seminar or the CBE Seminar during their first two years, but must attend at least two semesters of each during this time.]

- Students are encouraged to register for these each semester, if possible, although there are limits to the number of MB500 credits allowed in a Graduate Program (3 for M.S.)
- Have the office staff register you online – there are conflicts when taking multiple MB500 sections.

- **Thesis**

A thesis approved by the Graduate Committee, Department Head, and the Dean of The Graduate School is required.

A hardbound copy of Thesis must be provided to the Microbiology Department for inclusion in the Cotner-Morris library.



### **Master of Science (Plan B)**

Under this option, course work is substituted for Thesis requirement.

- **course credits**
  - A minimum of 30 credits is required for graduation.
  - At least half of these 30 credits must be in the major subject area (MB).
  - Two-thirds of the minimum 30 credits must be at the 5XX-level. (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 10 credits required.
  - Credit for a Professional Paper (MB 575) may not exceed 6 credits.
  - Course work more than 6 years old cannot be applied toward the program.
  - Transfer credits – see policy at [Transferring Credits](#)
- **pass-fail**

No more than 3 credits taken on Pass/Fail basis may be applied to a M.S. program (aside from thesis credits).
- **Core curriculum**

All M.S. students are required to take at least one course in **three** of the six areas of the core curriculum. The six areas of the core curriculum and the courses which can be used to satisfy the requirement are:

<b>core area</b>	<b>courses</b>	<b>to be offered</b>
Bioinformatics	MB 535 – Genomic Analysis (4 cr.) MB 537 – Advances in Molecular Evolution (3 cr.) MB 544 – Advanced Bioinformatics	Fall Fall Spring
Biochemistry	BCHM 543 – Proteins (3 cr.) BCHM 544 – Molecular Biology (3 cr.)	Fall alt odd yrs Spring alt odd
Immunology	MB 525 – Advanced Immunology (3 cr.)	Spring alt even
Microbial evolution & ecology	MB 515 – Advanced Microbial Ecology (3 cr.) MB 552 – Advanced Soil & Environmental Micro (3 cr.) ERTH 505 – Geomicrobiology	Spring alt odd Spring alt even Spring alt even
Microbial genetics & physiology	MB520 – Microbial Physiology MB 528 – Advanced Genetics (3 cr.) IMID 505 – Eukaryotic Gene Regulation (3 cr.) ENVE 566 – Fundamentals of Biofilm Engineering (3 cr.)	Fall Spring alt odd Spring alt odd Fall
Microbial pathogenesis & epidemiology	MB530 - Virology IMID 525 – Microbial Pathogenesis (4 cr) MEDS – Infectious Diseases and Microbiology (5 cr.)	Fall Fall Spring

\*Students who will be working with animals in their research are required to take MB 501- Principles and Techniques of Animal Experimentation

Courses required to fill each area of the core are likely to change as new courses are developed and approved by the Graduate Program Committee. Current course descriptions are available in the [MSU On-Line Catalog](#). Current course availability is found in the [MSU On-Line Schedule of Classes](#).

- **MB 500 seminars**

- All students are required to attend and participate in the **Departmental Seminar** (MB500 section 01) each semester in residence.

[Students who are also members of the Center for Biofilm Engineering will have the option of attending either the Departmental Seminar or the CBE Seminar during their first two years, but must attend at least two semesters of each during this time.]

- Students are encouraged to register for these each semester, if possible, although there are limits to the number of MB500 credits allowed in a Graduate Program (3 for M.S.)
- Have the office staff register you online – there are conflicts when taking multiple MB500 sections.

**Doctor of Philosophy**

• **course credits**

- A minimum of 60 post-baccalaureate credits\* are required for graduation.
  - \*The 60 credit minimum was instated for students beginning Fall 2007 semester. Students who enrolled prior to this time may stay with the 30 credit minimum previously required.
  - 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 18 dissertation credits (MB 690) are required.
- 20 credits of coursework are recommended and at least half of those must be in the major subject area (MB).
- Two-thirds of the minimum 60 credits must be at the 5XX-level or above. (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 10 years old cannot be applied toward the program.
- Transfer credits – see policy at [Transferring Credits](#)

• **pass-fail**

No more than 3 credits taken on Pass/Fail basis may be applied to a Ph.D. program (aside from thesis credits).

• **Core curriculum**

core area	courses	to be offered
Bioinformatics	MB 535 – Genomic Analysis (4 cr.) MB 537 – Advances in Molecular Evolution (3 cr.) MB 544 – Advanced Bioinformatics	Fall Fall Spring
Biochemistry	BCHM 543 – Proteins (3 cr.) BCHM 544 – Molecular Biology (3 cr.)	Fall alt odd yrs Spring alt odd
Immunology	MB 525 – Advanced Immunology (3 cr.)	Spring alt even
Microbial evolution & ecology	MB 515 – Advanced Microbial Ecology (3 cr.) MB 552 – Advanced Soil & Environmental Micro (3 cr.) ERTH 505 – Geomicrobiology	Spring alt odd Spring alt even Spring alt even
Microbial genetics & physiology	MB520 – Microbial Physiology MB 528 – Advanced Genetics (3 cr.) IMID 505 – Eukaryotic Gene Regulation (3 cr.) ENVE 566 – Fundamentals of Biofilm Engineering (3 cr.)	Fall Spring alt odd Spring alt odd Fall
Microbial pathogenesis & epidemiology	MB530 - Virology IMID 525 – Microbial Pathogenesis (4 cr) MEDS – Infectious Diseases and Microbiology (5 cr.)	Fall Fall Spring

All Ph.D. students are required to take at least one course in **four** of the six areas of the core curriculum. The six areas of the core curriculum and the courses which can be used to satisfy the requirement are:

\*Students who will be working with animals in their research are required to take MB 501- Principles and Techniques of Animal Experimentation

Courses required to fill each area of the core are likely to change as new courses are

developed and approved by the Graduate Program Committee. Current course descriptions are available in the [MSU On-Line Catalog](#). Current course availability is found in the [MSU On-Line Schedule of Classes](#).

- **MB 500 seminars**

- All students are required to attend and participate in the **Departmental Seminar** (MB500 section 01) each semester in residence.

[Students who are also members of the Center for Biofilm Engineering will have the option of attending either the Departmental Seminar or the CBE Seminar during their first two years, but must attend at least two semesters of each during this time.]

- Students are encouraged to register for these each semester, if possible, although there are limits to the number of MB500 credits allowed in a Graduate Program (3 for Ph.D.)
- Have the office staff register you online – there are conflicts when taking multiple MB500 sections.

- **Laboratory Rotations**

New students in the Ph.D. program are encouraged to participate in laboratory rotations. Students will be expected to work at least 12 hours per week in each rotation and will register for two semester credits of MB570 Individual Problems each semester.

- **Minor/Supporting Area**

A student has the option of including a minor (15 credits) or a supporting area (9 credits) in their degree program.

- **Dissertation**

A dissertation approved by the Graduate Committee, Department Head, and the Dean of The Graduate School is required. This must be submitted as an electronic dissertation not later than 14 days before the end of the semester.

- A hardbound copy of the dissertation must be provided to the Microbiology Department for inclusion in the Cotner-Morris library.

No more than five years may pass between successful completion of comprehensive exams and the time of completion of the Ph.D. degree.

Course work taken more than 6 years prior to admission into the graduate program may not be applied to the program.

## **GRADES IN GRADUATE SCHOOL AND EVALUATION OF PROGRESS**

### **Grades in Graduate School**

The graduate student must maintain at least a 3.0 grade point average (GPA) in all courses in the major, minor and supporting areas which are taken for graduate credit and which are listed on the student's program of study.

Any course listed in the major, minor or supporting areas in which a grade of "C" or lower has been received is considered by the Department as a failing grade. ***Two Cs are grounds for dismissal from our program.***

The Graduate School has also established a policy regarding grades in graduate school. The details of the policy are at [Graduate Student Grades](#).

### **Evaluation of Progress**

- **First Year Review**

The purpose of the first year review is to evaluate the progress of the graduate student at the end of year one of the graduate program. The Graduate Program Committee and the Department Head will initiate a review of each student's performance. Performance in courses, teaching, the research laboratory and participation in journal clubs and seminars will be included in the evaluation. The evaluation will be summarized and recommendations made by the Department Head. The results of the review will be shared with the graduate student and become part of the student's permanent file.

If progress is not satisfactory, the graduate student will be given a **qualifying examination** to determine if s/he should continue in the Microbiology Graduate Program or be advised to pursue a different discipline. If progress meets or exceeds expectations, the qualifying examination may be waived at the discretion of the Graduate Program Committee or the Department Head.

- **Annual Review**

After each year of residence, every graduate student will be evaluated by the Graduate Program Committee and the Department Head. In evaluation of students we include performance in courses, teaching, contributions to formal and informal seminars, progress in research projects, independence, and initiative. After completion, the results of the evaluation will be shared with the student and added to the permanent file.

If progress in the graduate program meets or exceeds expectations, the student will be encouraged to continue in the program to completion. However, if progress does not meet expectations, the student will again be reviewed in six months to determine if s/he should continue in the program or be advised to pursue a different discipline

## **EXAMINATIONS REQUIRED FOR COMPLETION OF GRADUATE DEGREES IN MICROBIOLOGY**

It is the student's responsibility to be sure that all committee members can be present when scheduling an examination.

### **Master's Degree Comprehensive Examinations.**

- **Comprehensive Examination for Plan A Master's Degree**

Before the end of the 4<sup>th</sup> semester (excluding summers), and once 2/3's of the course work has been completed, the student should schedule an oral exam with their Graduate Committee. This should follow a seminar presented by the student in Journal Club. The Journal Club presentation will serve as a focus for questions. However, other questions will be included in the examination to test breadth of comprehension.

- **Plan B Master's Degree Review and Oral Examination**

Plan B Master's Degree students must write a review of a topic in microbiology. The topic will be assigned by the student's Graduate Committee. This review should be completed and approved before the end of the 4<sup>th</sup> semester (excluding summers), and once 2/3's of the course work has been completed. The review shall be written using the guidelines found in the [instructions to authors](#) for the journal *Microbiology and Molecular Biology Reviews*. An oral exam is then scheduled within two weeks of the submission of the review. The review will serve as a focus for questions. However, other questions will be included in the examination to test breadth of comprehension.

If the student fails the examination, at least 2 months must pass before repeating it. A second failure will result in dismissal from the academic program.

### **Ph.D. Examinations**

- **Qualifying Examination**

A qualifying examination will be administered following the first year of coursework or the third research rotation (or summer research period, if rotations are not elected). The purpose of the qualifying examination is to determine if the student has the potential to succeed in the Ph.D. program. All students will be reviewed annually by the Graduate Program Committee or Department Head. The review for first year students will include a critical evaluation of performance in courses, research rotations, seminars, journal clubs, teaching etc. Based on the review, the Graduate Program Committee and the Department Head have the option of waiving the qualifying examination.

- **Comprehensive Examination**

All Ph.D. students must successfully complete a comprehensive examination no later than the 5<sup>th</sup> semester (excluding summers). Two-thirds of the coursework must have been completed. Inherently, the Ph.D. must be a creative individual. The Department of Microbiology has decided that one of the best measures of creativity is the preparation and defense of a comprehensive research proposal.

The student's Graduate Committee will agree on a problem. The student will have six weeks to thoroughly research and design a research proposal to address the problem.

The proposal will be written according to the guidelines of the NSF or NIH. The NSF Grant Proposal Guide can be accessed at: [NSF How to Prepare Your Proposal](#). The NIH forms can be found at: [NIH Proposal Instructions](#). Either the RO3 or R21 guidelines ([Types of NIH Grant Programs](#)) are applicable for an NIH type proposal.

Students should be thoroughly familiar with the forms and instructions before beginning the examination.

Use of proposal forms indicates that this is a serious training mechanism as well as an excellent test of creativity. The proposal must be an original effort completed within 6 weeks of the starting date and followed by a 2 week period for evaluation by the student's Graduate Committee. The Graduate Committee may request that a proposal be rewritten or recommend that the student proceed to the oral defense of the research proposal. Within two weeks of approval of the written research proposal, the student will give an oral presentation of the proposal to the Graduate Committee and orally defend the proposal. The purpose of the research proposal is to evaluate a student's ability to research, organize, write, present orally, and defend a creative research proposal.

No more than five years may pass between successful completion of comprehensive exams and the time of completion of the Ph.D. degree.

Completion of this exam will also serve as the comprehensive examination for a Master's Plan B degree, in the event that a Ph.D. student, for whatever reason, does not continue in the Ph.D. program.

If the student fails the examination, at least 6 months must pass before repeating it. A second failure will result in dismissal from the academic program.

#### **Examination Schedules and Funding.**

Continuance in the Graduate Program in Microbiology is contingent upon passing all required exams on schedule.

## **THESIS RESEARCH AND PUBLICATIONS**

### **Requirements Related to Thesis**

The primary role of the major professor and Graduate Committee is to guide the student throughout their thesis research. The research problem will be chosen after initial consultation with the major professor, followed by discussion with the student's Graduate Committee.

A written thesis outline or proposal must be submitted to and approved by the student's Graduate Committee prior to starting thesis research.

It is required that the student's Graduate Committee meet at least once each year following a formal presentation of the student's research to discuss the student's progress.

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

Thesis must be prepared and submitted electronically in the format described in the latest version of the [Electronic Thesis and Dissertation \(ETD\) Initiative](#). Previously published electronic theses and dissertations may be viewed at the [View ETDs](#) link.

Thesis draft must be approved by the major professor before it is submitted to the Committee. The student must defend Thesis orally no sooner than two weeks after submission of Thesis to the Committee. The oral defense consists of a public seminar followed by a detailed examination of the student and thesis by the Graduate Committee.

Notification of oral defense must be made, at least two weeks prior to defense, to The Graduate School and to the Microbiology Department so that proper posting can be made well in advance.

Final approval of Thesis rests with The Graduate School. That office reads Thesis for formatting, grammar and content.

In addition to the requirement of The Graduate School, hardbound copies labeled on the spine with the student's name and thesis title, must be supplied to the major professor and to the Microbiology Department. Printing and binding, including costs, are the responsibility of the student.

### **Thesis Progress and Funding.**

Continuance in the Graduate Program in Microbiology is contingent upon consistent progress in thesis research and writing (including the writing of manuscripts based on Thesis).



## **GRADUATE STUDENT ACTIVITIES**

### **Professional Affiliations**

Graduate students are encouraged to join a professional organization that is representative of their area of interest such as the American Society for Microbiology, the American Society for Virology, the American Society for Cell Biology or the American Association of Immunologists. Student rates are available.

### **Professional Meetings**

Students are encouraged to attend and participate in at least one major scientific meeting each academic year. Funds from the Department or the major professor's research program may be available to help defray travel expenses for students presenting papers. Graduate students with research programs well advanced are encouraged to present papers or posters at meetings of appropriate scientific organizations.

## **FINANCIAL AID**

Acceptance into a graduate program does not imply a commitment to provide financial assistance. However, students of high scholastic standing are encouraged to consult the Head of the Department for information about Assistantships, Fellowships and technical aid positions. Most of our graduate students are continuously supported through teaching or research assistantships if progress is satisfactory.

### **Assistantships**

Assistantships are awarded for either teaching or research. Teaching Assistants may teach one or more sections of an undergraduate class or laboratory, and/or help with laboratory preparation. Research Assistants are assigned to a research project being conducted by a staff member. Research done on an assistantship may or may not be applied to the student's thesis.

It is not acceptable for a graduate student to receive a full RA-ship and a full departmental TA-ship at the same time. However, since a TA stipend may be less than that earned by an RA, a faculty member may provide a partial RA-ship in order to ensure the student receives full stipend support while acting as a TA.

A number of teaching and research assistantships are available for the regular school year (August-May), and opportunities are available during the Summer Semester. The usual term of appointment for a Graduate Teaching Assistant is August 15 through May 15. The Graduate School has established minimum requirements for the award of a teaching or research assistantship.

### **Fellowships**

Fellowships are graduate scholarships obtained from off-campus sources and carry stipends. A student holding a Fellowship may carry a full graduate credit load and usually selects and works on research directed towards a thesis. However, the terms of some Fellowships are somewhat restrictive, and the student is expected to honor the objectives of the granting agency. Each Fellow is required to meet the academic requirements of The Graduate School and the Department of Microbiology. Inquire at Personnel and Payroll Services to determine if your assistantship is tax exempt.

### **Technical Aid**

Most of the staff members obtain research grants which include funds for graduate assistants and technical help. Pay schedules for graduate assistants are generally based upon a semester or a year. Technical employees are paid on either an hourly or monthly basis. In general, graduate students do not receive technical assistance towards the completion of their thesis project.

### **General Financial Aid**

Loans and work study opportunities may be available through Financial Aid Services.

### **Tuition Waivers**

TA tuition waivers, covered by the department, cover only tuition costs and not associated university fees. GRA tuition waivers are covered by the major professor from grant monies. These may or may not cover associated university fees as well as tuition.

## **READING MATERIAL IN MICROBIOLOGY**

The graduate student seeking a degree in Microbiology is expected to have a working knowledge of the textbook material in the undergraduate and graduate courses which s/he has taken in the major field. The texts used in these courses at Montana State University, or equivalents, will serve as an adequate background. The student should consciously try to improve his/her grasp of this material throughout his/her graduate program rather than waiting until shortly before comprehensive examinations.

The student should read and be familiar with one of the general histories of microbiology, such as *Milestones in Microbiology* by Thomas D. Brock or *A Chronology of Microbiology in Historical Context* by Raymond W. Beck.

Reading and understanding the major periodicals which publish research and review articles in microbiology should begin early in the graduate program. The MSU Library subscribes to a number of scientific journals. In addition, a large number of journals are available at their electronic journal site <http://www.lib.montana.edu/epubs/index.html>. The student should utilize current literature to become aware of timely developments and important areas of research and to aid in his/her own research. An excellent search engine is [PubMed](#). The reading list should include *Science* and *Nature* in addition to specialized journals.

Reading requirements for the Ph.D. candidate should include the above and further additions. The student should prepare a reading list, in consultation with the major professor, which covers the specialty in which s/he is interested, such as virology, medical microbiology, ecology, microbial physiology, etc. The Ph.D. student should read at least one book which deals with the interactions of science and other disciplines, or with the interrelations of biology with other scientific fields, or with the philosophy of science. S/he should have a thorough knowledge of modern currents in microbiological research and actively contribute to seminars and discussions as a result of regular reading of the current literature.

Graduate students should read and be familiar with books about scientific writing, for example, *How to Write and Publish a Scientific Paper: 6<sup>th</sup> Edition* by Robert A. Day.

We also recommend familiarity with the general principles governing the conduct of good science as outlined in the [NIH Guidelines for the Conduct of Research](#).

Students are encouraged to begin building a database of references using [Reference Manager](#), [EndNote](#), [ProCite](#) or other similar programs.

## **APPENDIX: MSU POLICY ON ACADEMIC MISCONDUCT**

from: [http://www2.montana.edu/policy/student\\_conduct/cg400.html](http://www2.montana.edu/policy/student_conduct/cg400.html)

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The administration, faculty and students of Montana State University believe that academic honesty and integrity are fundamental to the mission of higher education. The University has a responsibility to promote academic honesty and integrity and to assure the highest ethical and professional standards and behavior in the classroom. Accordingly, the University has developed procedures that address instances of academic dishonesty. Students who violate these standards commit academic misconduct and will be subject to academic and/or disciplinary sanctions.

### **410.00 ACADEMIC MISCONDUCT**

Includes cheating, plagiarism, forgery, falsification, facilitation or aiding academic dishonesty; multiple submission, theft of instructional materials or tests; unauthorized access to, manipulation of or tampering with laboratory equipment, experiments, computer programs, or animals without proper authorization; alteration of grades or files; misuse of research data in reporting results; use of personal relationships to gain grades or favors, or otherwise attempting to obtain grades or credit through fraudulent means.

### **420.00 DESCRIPTIONS AND EXAMPLES**

A description of some forms of academic dishonesty and some examples are provided to help the student understand his or her responsibilities for academic honesty:

- A. ***Cheating*** - giving, using or attempting to use unauthorized materials, information, notes, study aids or other devices in any academic exercise including unauthorized communication of information. Examples of cheating include copying from another student's paper or receiving unauthorized assistance during a quiz, test or examination; using books, notes or other devices such as calculators, unless authorized; acquiring without authorization copies of tests or examinations before the scheduled exercise; or copying reports, laboratory work or computer programs or files from other students.
  
- B. ***Falsification / fabrication*** - the invention or unauthorized alteration of any information or citation in an academic exercise. Examples of fabrication include inventing or counterfeiting data or research procedures to give the appearance of results being achieved from procedures that were not undertaken. Examples of falsification include the false citation of a source of information; altering the record of, or reporting false information about practicum or clinical experiences; altering grade reports or other academic records; submitting a false excuse for absence or tardiness; or altering a returned examination paper and seeking a better grade.
  
- C. ***Tampering*** - interfering with, altering or attempting to alter university records, grades, assignments, laboratory experiments or other documents without

authorization. Examples of tampering include using a computer or false-written document to change or affect the grade recorded for a student; forging the signature of a university official on a drop/add sheet or other official university record; erasing records or information of a student; unauthorized access to a university record by computer or unauthorized entry into an office or file; or obtaining information from the university without proper authorization.

D. **Plagiarism** - presenting the work of another as one's own without proper acknowledgment. Examples of plagiarism include submitting as one's own work the work of another student, ghost writer or commercial writing service; directly quoting from a source without acknowledgment; paraphrasing or summarizing another's work without acknowledging the source; or using facts, figures, graphs, charts or information without acknowledging the source. Plagiarism may occur orally or in writing and may involve computer programs and files, research designs, distinctive figures of speech, ideas and images or any other information that belongs to another person and is not acknowledged as such. Inadvertent or unintentional misuse or appropriation of another's work (such as relying heavily on source material that is not expressly acknowledged) is still considered plagiarism.

E. **Facilitating academic misconduct** - giving assistance or attempting to assist another in the commitment of academic misconduct.

F. **Multiple submission** - submitting the same paper or oral report for credit in two courses without the instructor's permission; making minor revisions in a paper or report for which credit has already been received and submitting it again as a new piece of work.

G. **Other Academic Misconduct** - Examples of academic misconduct include allowing another student to copy from one's paper during an examination or test; distributing test questions or substantive information about the material to be covered on a test before the scheduled exercise; collaborating on work with the knowledge that the collaboration is not authorized or will not be reported; or taking an examination or test for another student or signing a false name on an academic exercise.

## **430.00 SANCTIONS**

The following sanctions may be imposed for academic misconduct:

- A. oral reprimand;
- B. written reprimand;
- C. an assignment to repeat the work or an alternate assignment;
- D. a lower or failing grade on the particular assignment or test;

- E. a lower grade or failing grade in the course;
- F. removal of the student from the course in progress;
- G. removal of the student from a major, college or program;
- H. withdrawal of degree or academic credit previously bestowed; and
- I. any sanction that may be imposed for violation of the Student Conduct Code (reference Section 660.00), including disciplinary probation, suspension or expulsion from the University.

### **431.00 DISRUPTIVE STUDENT**

The primary responsibility for managing the classroom environment rests with the faculty. Students who engage in any prohibited or unlawful acts that result in disruption of a class may be directed by the instructor to leave the class for the remainder of the class period. The term "prohibited acts" includes behavior prohibited by the instructor, including but not limited to, smoking in the classroom, persistently speaking without being recognized or called upon, refusing to be seated, and disrupting the class by leaving and entering the room without authorization.

Longer suspensions from a class or dismissal from a course on disciplinary grounds must be preceded by a charge of a violation of the Student Conduct Code and by a Student Conduct Hearing as set forth in Section 650.00 of the Student Conduct Code, if requested by the student or the instructor. A student dismissed from a class as the result of a Student Conduct Hearing will be assigned a grade of F (Failing). The student may register to re-take the course at a later date in accordance with existing University policy.

It must be emphasized that this provision is not designed to be used as a means to punish classroom dissent. The expression of disagreement with the instructor or classmates is not in itself disruptive behavior.

### **440.00 ACADEMIC MISCONDUCT PROCEDURES.**

#### **441.00 Instructor Imposed Academic Sanctions.**

If an instructor has reason to believe that a student has engaged in academic misconduct, the following procedures apply:

##### **441.01 Informal meeting.**

The instructor should personally and privately advise the student that there is reason to believe that the student has committed an act that constitutes academic misconduct. The student should be allowed a reasonable opportunity to respond or explain.

If, after hearing the student's response (if any is provided), the instructor continues to believe the student engaged in academic misconduct, he or she will inform the student of his or her determination and of any intended sanction (s). An instructor is limited to imposing sanctions within the scope of the academic activity (sanctions A through E of Section 430.00). The instructor will prepare the [Academic Misconduct Notification](#) form and submit a copy to the student, the Department Head, Graduate Dean (if a graduate student) and the Dean of Students. The instructor has the right to refuse to sign a drop form for the class in question.

## **442.00 Additional Sanctions under Student Conduct Code**

### **442.01 Referral by Instructor.**

In addition to the imposition of the academic sanctions, an instructor may request in writing that the Dean of Students file a charge against the student for violation of the Student Conduct Code. If the student is found in violation of the Student Conduct Code, sanctions F-I of Section 430.00 may be imposed in addition to the academic sanctions.

### **442.02 Recurrence of Academic Misconduct.**

A student who has been sanctioned by instructors more than once at MSU will be charged with a violation of the Student Conduct Code and subject to additional disciplinary sanctions.

### **442.03 Right to Appeal.**

A student who receives an Academic Misconduct Notification under this section may request a hearing before the Student Conduct Board to contest the instructor's determination that academic misconduct occurred. The student must file a written request with the Dean of Students within five (5) working days of receipt of the Academic Misconduct Notification.

### **442.04 Grade Pending Resolution.**

If the student appeals the instructor's academic misconduct determination, an incomplete grade ("I") will be assigned until the matter is concluded. A grade assigned before the instructor's knowledge of academic misconduct may be changed after it was assigned if the grade was obtained through academic misconduct or by fraud.

### **442.05 Appeal Procedures.**

If a student appeals the instructor's academic misconduct determination, the procedures under the Student Conduct Code (Section 650.00) will be followed, as modified below.

- a. Decision of Student Conduct Board. In cases of alleged academic misconduct, the Student Conduct Board will determine whether the student engaged in academic

misconduct and will recommend any non-academic sanction outlined under Section 430.00 above. The decision of the Student Conduct Board will be forwarded to the Dean of Students (or designee) and to the relevant instructor (s).

- b. If the Student Conduct Board finds the student committed academic misconduct, the instructor imposed academic sanction will stand. If the Student Conduct Board finds the student did not commit academic misconduct, the instructor will have ten (10) working days to report his or her grade for the student's work. The instructor will forward his or her grade determination to the Dean of Students (or designee), and the Graduate Dean (if a graduate student).
- c. The Dean of Students will send a copy of the decision, the grade and the sanction (s) imposed to the student and the instructor, and the Graduate Dean if applicable. Either party may appeal the decision directly to the Provost subject to the criteria set forth in Section 670.00 of the Student Conduct Code. The decision of the Provost is the final decision of the University.