

# Microbiology Graduate Studies Handbook

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# 1 Handbook

## 1.1 Purpose

This handbook describes and presents the guidelines, rules of operation, and policies of the Graduate Program in Microbiology. It serves as the central source of information for both graduate students and faculty for the operation of the Program.

## 1.2 Relation to the Graduate School

The Graduate Program in Microbiology conforms to University rules as published in the [Graduate School Handbook](#). It follows the policies, rules and guidelines found in the Graduate School Bulletin.

## 2 Graduate Studies Committee

### 2.1 Role of the Graduate Studies Committee

The Graduate Studies Committee is the executive committee of the Graduate Faculty of the Program. It conducts routine matters related to graduate work and monitors the functioning of the Program. It coordinates graduate work in the program, assists members of the Graduate Faculty and represents the Program in performing specific functions related to operations of the Graduate School as defined in the Graduate School Bulletin and the [Graduate School Handbook](#). Actions proposed by the Graduate Studies Committee are approved by the Graduate Program Faculty.

### 2.2 Graduate Studies Committee Composition

The Graduate Studies Committee is composed of at least three Graduate Faculty, one of whom serves as Chairperson, and one graduate student. All members are appointed by the Microbiology Department Chairperson, in consultation with the Graduate Faculty, for terms designated by the Department Chairperson.

Current Graduate Studies Committee:

- Dr. Chad Rappleye (Chair)
- Dr. Juan Alfonzo
- Dr. Chuck Daniels
- Dr. Purnima Dubey
- Rodney Tollerson (graduate student representative)

### 2.3 Graduate Studies Committee Duties

The Graduate Studies Committee is responsible for the Graduate Admissions activities of the department.

Specific duties of the Graduate Studies Committee include:

- Publishes a graduate program handbook containing the policies, rules, and procedures of the Graduate Program
- Establishes rules and procedures for the conduct of the [Candidacy Examination](#)
- Establishes rules and policies for the selection of [advisory committees](#)
- Determines eligibility of students to hold GTA appointments
- Recommends action on curricula, graduate courses, and program changes
- Specifies [criteria and credentials for admission to the graduate program](#) in addition to those required by the Graduate School
- Reviews applications to the Graduate Program and nominates applicants for admission
- Reviews requests from students for changes in program, registration, and credits
- Nominates faculty to the Graduate School for [category P status](#)
- Appoints faculty to the Graduate Program for [category M status](#)

#### 2.3.1 Graduate Faculty Nominations

##### Category P Qualifications

Qualifications

- The faculty member holds appointment as a tenure-track or research track faculty member
- The faculty member holds a Ph.D., D.M.A., Ed.D., or equivalent
- The faculty member is engaged in an active program of research or demonstrates significant

promise of establishing such a program

#### Process

- The candidate faculty member provides members of the Graduate Faculty with a CV and Summary of Research.
- The candidate faculty member gives a seminar to the department on their research
- The Graduate Program faculty approve nominations to Category P status
- The Graduate Studies Committee Chairperson nominates the candidate through Grad Forms using the Graduate Faculty Form

### **Category M Qualifications**

#### Qualifications

- The faculty member holds a tenure-track or clinical faculty appointment
- The faculty member holds a master's degree or higher, or equivalent

#### Process

- The Graduate Program faculty approve nominations to Category M status
- The Graduate Studies Committee Chairperson notifies the Graduate School of the appointment

## **3 Advisors and Advisory Committees**

### **3.1 Advising for first-year students**

The Graduate Studies Committee Chairperson serves as a temporary advisor for incoming students and assists the students in choosing courses and in initiating their graduate program during the first year of study.

### **3.2 Research Advisor**

Students are required to do three seven-week rotations in laboratories of interest. Students are strongly encouraged to contact and/or visit faculty members they are considering for rotations or permanent location to obtain additional information, prior to the faculty agreeing to allow the student to rotate. Students will be required to initiate and complete a Rotation Agreement Form prior to beginning each rotation. Rotation assignments are made by the Graduate Studies Committee Chair based on ranked choices by the students and available space in research laboratories.

At the end of the three rotations (and not before), students submit a ranked list of three potential advisors to the Graduate Studies Committee Chair, who will consult with the faculty members before making laboratory assignments. The choice of an advisor must be the result of mutual agreement between student and advisor. The advisor for a Ph.D. candidate makes a commitment to the student to oversee progress of the student's laboratory research and class work. The student makes a commitment as an apprentice scientist to undertake laboratory research on a project to which they mutually agree. This association of student and advisor is a substantial commitment of time and resources by both parties. The obligation between both parties should compel students and faculty to seriously consider their choices in this regard.

The advisor has the primary responsibility of overseeing the graduate student's choice of coursework, and provides guidance on the student's conduct of study and research. A Master's degree advisor must have at least Category M Graduate Faculty status; Ph.D. Advisors must be Category P. Currently, all Microbiology Graduate Faculty hold Category P status. Category M Faculty members can serve as Ph.D. Advisors under the supervision of a Category P faculty member.

### **Financial Responsibility**

Advisors assume financial responsibility for the student after the first year. Funding of graduate students as graduate research associates (GRAs) can be through grant support, fellowships, etc. Support for students as graduate teaching associates (GTAs) is provided to faculty members based on the availability of positions to the department. Salaried, non-tenured faculty are given first priority and positions are subsequently offered to salaried, tenured faculty of the department on a limited basis. If GTA positions are still available, they can be provided to non-salaried, courtesy-appointed faculty of the program. However there is no guarantee that students advised by non-salaried courtesy-appointed faculty will be provided GTA positions.

### **Direct Admission**

Students who have made contact with an individual faculty member prior to arriving on campus, and only after the faculty member's approval, can petition the Graduate Studies Committee to waive the rotations. In this latter case, both the student and faculty member must write a letter of petition; this is to ensure that all parties are aware of the decision and are in agreement. Advisors who agree to accept a student without rotations must provide the first year of support for the student.

### **3.2.1 Changing Advisors**

Students choose an advisor whom they deem appropriate for their specific scientific interests. Despite careful consideration, errors in judgment may be made and the student may wish to change advisors or the advisor may suggest the student find another laboratory.

Students should be aware that changing laboratories will almost always result in lengthening the time before the Ph.D. is completed. Students who passed the Candidacy Exam with a previous advisor and subsequently transfer to a new advisor should be aware that the Graduate School rules require that the student still complete their dissertation requirements within five years after the Candidacy Exam. If more time is required, a second Candidacy Exam will be necessary, and if successfully passed, the student will be granted a maximum of two years following the second candidacy exam to complete their dissertation requirements.

Research projects will not be transferred to another laboratory without the permission of the current advisor. The transferring student's dissertation will be based on experiments performed under the supervision of the new advisor.

#### **Student-initiated Change**

In the event that a student wishes to change laboratories, the following protocol will be followed.

- The student may wish to first discuss issues with the current advisor.
- If a change in advisors is still desired, the student must meet with and explain the situation to the Graduate Program Chairperson. The student must not meet with other potential advisors within the Department. The Graduate Program Chairperson will discuss the concerns of the student with the current advisor.
- If BOTH the student and the advisor agree, the Graduate Program Chairperson will arrange a meeting of the student, advisor and Graduate Program Chair or designated representative to see if a solution may be found.
- If after consultation of the Graduate Program Chairperson with the advisor and student a solution cannot be found, the student may discuss the possibility of changing laboratories with other faculty members within the Department.

#### **Advisor-initiated Changes**

In the event that an advisor wishes to terminate their role as advisor for a student, the following protocol will be followed:

- The advisor must document their evidence of dissatisfaction with the student's performance or progress by a "U" grade in dissertation research, with a written justification of the grade provided to the student and a copy to the Graduate Studies Committee
- A meeting with the student's Advisory Committee and the Graduate Studies Committee Chairperson will be held
- After consultation with the Advisory Committee, the advisor, and the student, the Graduate Studies Committee will determine if the student should be asked to leave the program or allowed to transfer to a new advisor

If the decision is made to allow the student to transfer to a new advisor, the student will be responsible for finding another advisor who will accept them into their research group.

If a new advisor is not found within the current term, the student will be dismissed from the program at

the end of the term. The student will be allowed the option to receive a Master's Degree provided that the advisor or a new advisor can be found to chair the MS degree advisory committee and the student completes all requirements by the end of the term. Whether continuing with a new advisor or not, the student will remain appointed as a GRA or GTA for the duration of the current term.

### **3.3 Advisory Committee (Dissertation/Thesis Committee)**

Each student must have an Advisory Committee consisting of the advisor and at least three other graduate faculty members, two of whom must be from the Department of Microbiology graduate program. Students are expected to have formed their Advisory Committee prior to the Summer Semester of their first year and no later than the beginning of the second year of graduate study. The student and advisor select suitable committee members based on the student's research direction(s). The advisor will be Chair of the committee.

The Graduate Studies Committee Chairperson must be notified, in writing, of the composition of the Advisory Committee. If a change in the composition of the Advisory Committee (or Dissertation Committee) is desired, the proposed change must be submitted to the Graduate Studies Committee for approval.

## 4 Degree Programs

The Department of Microbiology does not formally accept students into the Master of Science (M.S.) degree program. However, after admission to the Ph.D. program, and under special circumstances, students may transfer to the Master of Science degree program, either Plan A (Thesis) or Plan B (non-Thesis).

Fellowships, teaching associateships and research associateships are available for qualified Ph.D. students. Every effort is made to provide financial support to Ph.D. students throughout their graduate programs as long as they remain in good academic standing. Master's program students may be provided with financial assistance. The decision to offer assistance to a Masters student is made on an individual basis and is dependent on the qualifications of the student and the availability of funds.

Because each student is required to make reasonable and satisfactory progress toward the graduate degree during each semester of enrollment, any student enrolled in the Microbiology Graduate Program and who holds a Graduate Research Associateship (GRA), Graduate Teaching Associateship (GTA), Graduate Administrative Associateship (GAA), fellowship, or scholarship appointment is prohibited from additional outside employment without the knowledge and written consent of the Dissertation Advisor. Failure to comply with this rule may result in termination of support.

## 5 The Ph.D. Program

### 5.1 Overview

The Ph.D. Program is designed to prepare the candidate for a career as a research scientist. For students in the Microbiology graduate program, this training averages 5.5 years. The student works closely with the advisor to develop an individual student's program within the guidelines laid down by the Graduate School and outlined in this handbook. Typical aspects and timeline of a graduate student's training include:

Formal instruction through graduate-level coursework	Years 1-2
Laboratory Rotations (three)	Year 1
Formation of the Advisory Committee	end of Year 1
Candidacy Exam	Autumn, Year 3
Completion of Dissertation Requirements  1. Completion of Core and Elective Coursework  2. Presentation in MICRBIOL 8899 (at least twice)  3. Service as a Teaching Assistant (at least one semester)  4. Publication of at least one primary research article  5. Completion of the Written Dissertation  6. Successful completion of the Final Oral Examination	Years 3-5

In the first year, students will complete three rotations in potential laboratories for their thesis research. At the end of the first year, students will have joined a laboratory and should form an [Advisory Committee](#). In the event a student does not find a laboratory for their dissertation research, the student can complete a fourth rotation to try to find an advisor. If a student has not found a research laboratory for their dissertation research, the student will meet with the Graduate Studies Committee chairperson to discuss options for a master's degree.

The student develops a research project and prepares a dissertation under the guidance of the advisor and with the help of the [Advisory Committee](#). The student should meet with their Advisory Committee at least once a year, starting at the first semester of the second year of graduate study. These meetings, described more fully in [Progress Review](#), are to aid the student and advisor in evaluating the student's performance and to obtain advice from the Advisory Committee on the research project.

## 5.2 Course Requirements

Students will complete a total of at least 80 credit hours. Of these, at least 18 credits must be graded courses (i.e., not S/U grading) in which a B or higher grade is required. These graded credits are typically completed during the first two years with core and elective courses.

The remaining hours are comprised of seminar courses and research credit hours. Pre-candidacy students will enroll in 12-18 hours (Autumn and Spring) or 3-12 hours (Summer) per term. Post-candidacy students enroll in three credit hours per term.

### 5.2.1 Microbiology Core Courses

Students entering the Ph.D. program will complete a four-course, 11 credit-hour graded core curriculum during the first year of study. In the Autumn Semester students will take:

- MICRBIOL 6010 (2 credits): Principles of Microbiology
- MICRBIOL 6020 (3 credits): Microbial Physiology and Biochemistry

In the Spring semester, students will select two from three course options:

- MICRBIOL 5161 (3 credits): Bioinformatics and Molecular Microbiology
- MICRBIOL 6155 (3 credits): Microbial Ecology and Evolution
- MICRBIOL 6080 (3 credits): Advanced Microbial Genetics

### 5.2.2 Elective Courses

In addition to the core courses, students are required to complete at least 7 hours of graded electives, typically taken during the second year of study. Selection of electives appropriate to the student's research are chosen by the student in consultation with the Advisor and the Advisory Committee. A list of approved elective courses is provided here. Students may take other elective courses as appropriate for their dissertation research; these courses must be approved in advance by their Advisory Committee.

The student's Advisor, in consultation with the Advisory Committee, will provide guidance for the selection of courses needed to meet the requirements for Microbiology course distribution and the overall credit hour requirements.

### 5.2.3 Seminar Courses

All graduate students will enroll in Microbiology seminars each Autumn and Spring semester throughout their program:

- MICRBIOL 8899 (1 credit): Seminars in Microbiology (Student Seminars)
- MICRBIOL 7899 (1 credit): Microbiology Colloquium (Departmental Seminar Series)

All students are required to attend each seminar throughout the year in both Micro 7899 and 8899; students failing to do so, and not receiving approval to miss a seminar, will receive a grade of U.

Ph.D. students are required to complete a minimum of two presentations in MICRBIOL 8899.

In addition, students must complete MICRBIOL 7600 (1 credit; First-year Student Orientation), typically during the first semester.

### 5.2.4 Research

First year students will do three 7-week laboratory rotations during their first year. For these, students will enroll in MICRBIOL 6789 (Research Principles and Techniques in Microbiology) in the Autumn and Spring semesters of their first year with the Graduate Studies Committee Chair serving as the

temporary advisor.

After joining a laboratory for their dissertation research, students will enroll in either MICRBIOL 7899 Research in Microbiology (pre-candidacy students) or MICRBIOL 8999 (post-candidacy students) each term (including Summer term) under their Advisor.

## **5.2.5 Registration**

The number of credit hours attempted each semester is mutually determined by the student and the advisor and reflects faculty and student effort and the extent to which University resources are utilized. Course loads for full-time students can vary, as noted below. A student may not enroll for more than 18 credit hours per semester, 8 hours in Summer Session, without Advisor and Graduate School approval. This includes audited courses.

## **Post Candidacy & Continuous Enrollment**

All students who successfully complete the doctoral Candidacy Examination (“post-candidacy”) are required to be enrolled in every semester until graduation. These students must be enrolled for at least 3 credits per semester. This policy is effective for all students who were admitted to the Graduate School Autumn Semester 2012 and after (Section 7.8).

## **Graduate Associates (GA)**

Graduate associates, either graduate teaching associates (GTAs) or graduate research associates (GRAs), holding 50 percent or greater appointments must register for at least eight credit hours per semester, except in summer when the minimum is four credits. (Microbiology pre-candidacy students are encouraged to register for 12 credit hours per semester, four in summer session.) GAs holding a 25 percent appointment must register for at least four credit hours per semester, two credit hours in summer session. Post-candidacy doctoral students must register for at least three credit hours each semester an appointment is held, including summer term.

## **Fellows (Students on Fellowships)**

Pre-candidacy doctoral students holding the title of graduate fellow, regardless of the source of the funds, must register for a minimum of 12 credit hours each semester the appointment is held (six credit hours during Summer Session). Graduate fellows who are post-candidacy doctoral students must register for at least three credit hours per semester, including Summer Semester.

## **Short-term Leave**

Funded graduate students requesting to take time off must complete a short-term leave form; this does not apply to weekend-only travel or holiday breaks during which campus is closed. Any absence during academic breaks (e.g., Spring break or Winter break) requires completion of a short-term leave form. Short-term leave must be approved in advance by the student’s advisor and the student’s TA supervisor (if the student is a GTA) and the form turned into the Graduate Studies Committee.

## **Partial Enrollment**

Part time registration is permitted only with approval of the Graduate Studies Committee. Students are expected to complete all required graded coursework (core and electives) within 5 semesters of initial enrollment.

Graduate students who do not enroll in the Graduate School for longer than one year, at any time

during their Ph.D. program, are considered to have left the Program and must petition the Graduate Studies Committee for re-enrollment, unless prior arrangement has been made with the Advisor and Graduate Studies Committee.

## **5.2.6 Sample Course Schedule**

## **5.2.7 Transfer Students**

Students who are transferring to the program from another institution with their advisor will not be required to participate in rotations. These transfer students are expected to establish their Advisory Committees no later than completion of the first term in the program. This committee, in consultation with the Graduate Studies Committee, will determine which core and elective courses are required to supplement the student's prior coursework. Doctoral students must complete 80 credit hours to qualify for the degree; students transferring to OSU from another university must complete at least 30 credit hours at OSU.

## **5.3 Teaching Experience**

All graduate students are required to gain teaching experience through undergraduate classroom/laboratory instruction by serving as a graduate teaching associate (GTA) for a minimum of one semester. As soon as the appointment is made, each GTA should check with the instructor in charge of the course for instructions on their teaching assignments and duties prior to the beginning of the semester; a GTA position is a 50% appointment. In most instances, students will fulfill the teaching requirement during their first year. For students transferring from another institution, teaching for a minimum of one semester at their previous institution will fulfill this requirement.

## **5.4 Publication Requirement**

The student must have one or more primary research publications in peer-reviewed journals before applying for graduation with a Ph.D.

At least one of the student's publications must list the student as first author. The paper must be published, in press, or accepted. Submitted manuscripts and manuscripts "in preparation" will not be counted. Review articles, even if peer-reviewed, will not fulfill the publication requirement for the Ph.D. degree. Although a minimum of one first-author publication is required by the Microbiology Graduate Program, individual labs may require more.

Students will not be allowed to complete their Dissertation Defense unless the requirement for publication has been met. It is the responsibility of the student and the advisor to assure that this policy is followed.

## **5.5 Scientific Communication**

In addition to written publications, students are expected to develop skills for oral presentation and communication of scientific results. Each Autumn and Spring semester, students will enroll in MICR 8899 (Seminar in Microbiology), in which students develop presentations on their research and receive feedback and critique for improvement. Students must present in MICR 8899 at least twice during their PhD training.

## **5.6 Review of Students' Progress**

To assist the development of each student, a review of progress will be made by the student's Advisory Committee. These reviews should occur at least annually. It is the responsibility of the student and his/her advisor to plan review meetings and to ensure that reports of the meetings (Annual Review Form) are sent to the Program Coordinator ([micro.grad@osu.edu](mailto:micro.grad@osu.edu)) for placement in the student's file each year.

### **5.6.1 First-Year Review**

The First Year Review, which should occur at the start of the second year, provides the first official opportunity for the student to meet with the Advisory Committee. The student should bring a summary of his/her coursework and grades, and prepare a short oral presentation of his/her research project. The committee will review the academic record and plan of the student and provide advice on the design and implementation of his/her research.

The advisor will submit an Annual Review Form to the Graduate Studies Committee Chairperson; if the advisor feels there are deficiencies, a letter addressing these deficiencies will be provided to the Graduate Program Chairperson and the student. The Graduate Studies Committee Chairperson reviews these summaries, and if necessary discusses any problems with the advisor, the student, and the Graduate Studies Committee.

### **5.6.2 Second-Year Review**

Near the end of the second year of graduate study, all graduate students are required to schedule a committee meeting. This Second Year Review serves as an evaluation of the student's progress toward the degree and as a planning meeting for the Candidacy Exam proposal. The Candidacy Exam must be taken by the end of Autumn Semester of the third year of enrollment; students who fail to meet this requirement will be denied enrollment (exceptions are by petition to the Graduate Studies Committee, and will be granted only under extreme extenuating conditions such as serious illness).

The Second Year Review is intended to be an interactive discussion of student's research progress and his/her plan for the Candidacy Exam proposal. The student should provide a summary of his/her coursework and grades, which will be reviewed by the committee to ensure that the curriculum requirements have been adequately met. Then, the student will present his/her research progress and an outline of proposed Aims for the Candidacy Exam document. The student should plan an approximately 30 minute oral presentation and be prepared for an active discussion.

The Candidacy Exam proposal should include three Specific Aims. Two of the Aims will focus on research that is actually planned for the dissertation. The remaining Aim (the independent Aim) can be on a related topic, but cannot address a question currently under investigation in the advisor's laboratory. The student is required to come to the meeting with 2-3 suggestions for the independent Aim. Ideas for this Aim must originate from the student and may be discussed with the advisor prior to the meeting. By the close of the Second Year Review, the Specific Aims of the proposal should be agreed upon (by the committee members and student). The advisor will submit an Annual Review form to the Graduate Program Chairperson that summarizes the meeting and includes a list of the Aims decided upon.

### **5.6.3 Candidacy Examination**

Advancement to candidacy requires successful completion of a written proposal (the Candidacy document) and an oral defense (the Candidacy Examination). The student will have four weeks to

prepare the written document (described below). After passing the written portion, the student will defend their document in the Oral Examination, which normally occurs two to three weeks after passing the written portion. The Advisory Committee becomes the Candidacy Examination Committee.

## Candidacy Examination Timeline

Task	allowed time	elapsed time
2 <sup>nd</sup> Year Review & assignment of specific aims	start	week 0
Completion of Written Proposal	4 weeks	week 4
Committee review and approval of Proposal	1 week	week 5
Oral Examination	2-3 week	week 7-8

As OSU faculty serve on many candidacy examination committees within and outside of the Microbiology department, students should provide their committee members information on Microbiology policies regarding Candidacy (i.e., by providing them with a copy of section 5.6.3 describing the Candidacy Examination).

### 5.6.3.1 Candidacy Document

After the Second Year Review, the student will have four weeks (28 days) to prepare his/her Candidacy Exam proposal. This proposal follows that of an NIH R01 application. The scope of the proposal should include sufficient work to occupy the full-time efforts of a single researcher for a two-year period. The proposal must have the following sections: Abstract, Specific Aims, Research Strategy, and References. The Research Strategy section has subsections titled Significance, Innovation, and Approach. The document must not exceed one page each for the Abstract and Specific Aims, and 12 pages for the Research Strategy. It is suggested that roughly half of the Research strategy be on the two aims of the student's dissertation research and half be on the independent Aim. The References section does not count toward any page limits. The pages are single spaced with font and margin limits as described in the NIH instructions. Students are encouraged to review the candidacy exam guidelines (<https://microbiology.osu.edu/gradstudents/examchecklist>). Students send a copy of the candidacy document and a proposal evaluation form to each member of the Advisory committee.

Within one week of submission of the document, each committee member will complete the proposal evaluation form and submit it to both the advisor and student. The proposal will be graded as High Pass, Pass or Unsatisfactory. A minimum grade of Pass is required from all committee members before the student can schedule the oral portion of the exam. Once the student passes the written portion of the exam, the oral portion of the exam should normally be held within three weeks. Scheduling of this exam, and the completion of the Doctoral Notification of Candidacy Examination form, should begin immediately (see below).

If any committee member finds the proposal to be unsatisfactory, the student will have two weeks to revise and resubmit the document to the committee. The revised document will need approval from the Committee, but will not be re-graded and the student must defend this document in the oral exam.

In the circumstance where the Committee decides that the proposal is unacceptable, the student may waive the right to take the oral portion of the examination (per Graduate School rules) by submitting a written statement requesting the waiver to the Committee. The results of the Examination are recorded as “unsatisfactory” with the Graduate School. The Committee will then decide whether the student will be permitted to later take a second Candidacy Exam and must record the decision on the Candidacy Examination Report form.

The student must complete the Notification of Candidacy Examination form with the scheduled date of the oral examination; this must be completed online at Grad Forms. This form must be submitted to the Graduate School at least two weeks in advance of the scheduled oral examination. If this form is not completed, the oral exam will be rescheduled. If this is a second attempt at the Candidacy Exam, the student also provides a copy of the proposal to the Graduate Faculty Representative (who is appointed on second candidacy exam attempts) as soon as the Graduate School informs the advisor.

### **5.6.3.2 Oral Examination**

Two to three weeks after approval of the written document, an oral examination will be conducted in which the student defends the proposal. The Advisory Committee selected for the Second Year Review will evaluate the student in this exam. The advisor serves as the chair of the Examination committee and coordinates questioning during the examination.

At the beginning of the oral exam, the student may give a BRIEF overview of the goals of the proposal, which will be followed by the question and answer period. The student should be prepared to answer questions on the rationale, design, and implementation of the experiments as well as his/her general knowledge of the field. All committee members, including the Advisor, are expected to participate in the questioning of the student. The Advisor is allowed to clarify questions or re-phrase things, but is not allowed to help the student with any answers. It is expected that committee will be self-policing so that one committee member does not dominate, or that any committee member’s involvement does not affect the impartiality of the exam. As with the Candidacy document, it is suggested that roughly half of the examination cover the independent aim. The entire exam cannot last more than two hours.

The discussion and decision about the outcome of the candidacy examination is done in the absence of the student (i.e., the student is asked to leave the room while the committee reaches their decision). The committee must unanimously agree that the student's performance was satisfactory for the student to pass. The Advisor participates in the deliberation and the voting. It is recommended that the Advisor allow other committee members to discuss and voice their decisions first before rendering his/her decision. Committee members’ approvals will be entered at Grad Forms (email links are sent to the committee members). The student is brought back into the room and informed of the committee’s decision. Students who pass the written and oral portions of the Candidacy Exam will be advanced to Candidacy.

If the Candidacy Exam is deemed unsatisfactory by the examining committee, the committee may choose one of three options:

- recommend that the student retake the oral defense portion of the exam, based on the original written proposal
- recommend that another written proposal and oral examination be given, at a time suggested by the Committee
- recommend that the student transition to the Master’s program and not be advanced to candidacy
- recommend that the student withdraw from the graduate program

In accordance with the Graduate School rules, no student is permitted to take the Candidacy Exam more than twice. On the second attempt, the Graduate School will assign a faculty representative to participate in the examination. A student whose performance is Unsatisfactory on two attempts at the Candidacy Exam is not permitted to be a doctoral candidate in the same or in any graduate program at this University.

#### **5.6.4 Reviews after the Second Year**

Students are required to have annual committee meetings, to provide updates on research progress and modifications of the research plan, and to obtain input from the Advisory Committee. Students should prepare a short progress report (1-2 pages) which should be given to the Committee members before the meeting. This document should be placed in the student's file as an appendix to the Annual Review.

An Advisory Committee meeting will be held one semester before the anticipated semester of graduation. During this meeting the student will summarize the research accomplished to date. The committee members will review the material to be included in the Dissertation, and will make specific recommendations concerning the completion of the Dissertation.

## 6 Completion of the Ph.D degree

After completion of the coursework and publication requirements, graduation with a PhD involves three components:

- The Written Dissertation
- The Final Oral Examination
- A public seminar

The Dissertation Committee consists of the student's Advisor and at least two other faculty members from the Microbiology Graduate Program. At least three members of the Dissertation Committee must be Category P Graduate Faculty members of the Department of Microbiology Graduate Program. In most cases, the student's Advisory Committee will become the Dissertation Committee for the Dissertation and the Oral Examination. In the event that a member of the Advisory Committee has recently left the program (e.g., taken a position at another university), the student can request that the faculty continue to participate as a faculty member in the Final Examination by completing a "Committee and Examination Petition" on Grad Forms and providing an explanation and justification for the request. Additional members of the Final Oral Examination Committee are permitted within the rules of the Graduate School. Further information on the Ph.D. program requirements can be found in section 7 of the [Graduate School handbook](#).

Students should pay particular attention to deadlines for the application to graduate and deadlines for the dissertation and final exam approvals.

### Dissertation and Oral Defense Timeline

Task	Relative time
Application to Graduate (Grad Forms)	(3 <sup>rd</sup> Friday of the term)
Committee review of Dissertation Document (> 1 week)	week (-3)
Committee approval / Application for Final Exam (Grad Forms)	week (-2)
Oral Examination	week (0)

### 6.1 Application to Graduate

Following successful completion of the required elements for the degree, students must apply to the Ohio State University Graduate School for graduation (<http://gradforms.osu.edu>). The application must be completed no later than the third Friday of the term in which graduation is expected. Students who will complete all degree requirements after the end of classes but before the first day of classes for the following semester can select the "End of Semester" option. Students who will not complete the degree requirements by the first day of the following semester will have to graduate in the next semester. Applications are good only for one semester.

The application to graduate must be approved by the Graduate Studies Committee Chair and the Dissertation Committee. Before approval from the Graduate Studies Committee, the student must schedule an interview with the Graduate Studies Committee Chair in which the program requirements

for graduation will be reviewed. Students should come prepared with information regarding:

- Coursework and grades
- Scientific publication(s)
- Course(s) in which they have served as a GTA
- Completion of the MICR 8899 presentation requirement

## 6.2 Dissertation Document

A student must complete a written dissertation describing their research and following the format and rules established by the Graduate School ([Graduate School Handbook, section 7](#)). The composition of the written document is determined [in consultation with the Advisor and the Advisory Committee](#). The student is responsible for distribution of electronic or paper copies of the Dissertation to the Dissertation Committee members. The Dissertation Committee must have at least one week to review the written Dissertation. Committee member approval of the written document and advancement to the Final Oral Examination is done through GradForms, a link for which is sent to the faculty upon the student's submission of the Application for Final Exam in Grad Forms. The Dissertation Committee must agree unanimously that the dissertation (draft) is satisfactory before the student may proceed to the Final Oral Examination. Dissertation approval and completion of the Application for Final Exam must be completed at least two weeks before the Oral Examination date. This means that the written document must be given to the Dissertation Committee at least three weeks before the anticipated Oral Examination.

## 6.3 Final Oral Examination

The Final Oral Examination ("Dissertation Defense") is an oral examination evaluating the candidate's knowledge and research performance. The Final Oral Examination is conducted by the Dissertation Committee plus a Graduate Faculty Representative (arranged by the Graduate School). No less than one week before the Final Oral Examination, the student must provide the Graduate Faculty Representative with a copy of the Dissertation. The student's Advisor serves as the chair of the Final Oral Examination Committee.

The time and place of the examination is determined by the advisor in consultation with the student and members of the Advisory Committee. The Final Oral Examination must occur between two and four weeks after the Dissertation document has been approved.

The examination lasts no more than two hours. All members of the Dissertation Committee must be present during the entire examination or on video conference, adhering to the [Graduate School's guidelines for video conferencing](#). All Committee members are expected to participate fully in questioning during the examination and discussion of the Exam result. The Graduate Faculty Representative reports their judgment regarding the quality, the fairness, and, conformity of the examination to the Graduate School rules. The Committee must unanimously agree that the student's performance is satisfactory to pass. The Advisor votes last. Committee members report the Oral Examination outcome on Grad Forms.

## 6.4 Public Seminar

Students are required to present a public lecture on their research before graduation. Often, students will give a public seminar on their dissertation immediately prior to the Final Oral Examination. The Graduate Faculty Representative does not need to attend the Public Seminar, but should be invited to attend.



## **7 Transfer to the Master of Science Program**

Ph.D. students who leave the program can receive the Master of Science (M.S.) degree after fulfilling the requirements for one of two M.S. degree programs (Plan A or Plan B). The decision to leave the doctoral program usually occurs at one of two time points

- End of the first year (Plan B (non-thesis) M.S. degree)
- Before or after the completion of the Candidacy Examination (Plan A or Plan B M.S. degree)

Some students may decide after completing the first year coursework and laboratory rotations to pursue a non-thesis M.S. degree (Plan B). Alternatively, some students will have selected a doctoral thesis advisor and completed their coursework under the guidance of their Advisor and Advisory Committee, but leave the program before or after they have completed the Candidacy Examination. This latter group of students has often completed substantial research in their first two years and they are expected to complete a M.S. thesis (Plan A). They may also choose the non-thesis M.S. option; however, the student and the advisor must agree upon this decision since granting agencies will require documentation of the student's work. In all cases the student's Advisor and the Graduate Studies Committee must approve the transfer from the Ph.D. program into one of the M.S. degree programs.

It is important to note that transfer from the Ph.D. program to a Master's program may result in termination of departmental support at the end of the semester in which the transfer occurs.

Students receiving a M.S. degree may not apply for either new or continuance to a Ph.D. degree in the Department of Microbiology. M.S. degree students can apply to other Ohio State University graduate programs.

It is the responsibility of the student to contact the Graduate School and obtain the proper documents and applications for the M.S. exam.

Students in the Plan B option must request reinstatement in the Program if they fail to enroll in courses for 1 or more semesters. The Graduate Studies Committee will decide upon the request for reinstatement.

### **7.1 Thesis M.S. degree (Plan A)**

The Plan A M.S. degree is based on research performed by the student as well as their coursework completion. The degree requires an oral defense and a written thesis. The M.S. advisory committee is comprised of 3 graduate program faculty (at least category M) and normally includes the student's former Ph.D. Advisory committee members with the Advisor serving as Chairperson. Students have an annual meeting with their Advisory Committees to aid in the development of their programs and to evaluate their progress. These meetings follow the format of the annual meetings as described for the doctoral program. Students in the Plan A Master's program may also transfer between Plan A and Plan B Master's programs.

#### **7.1.1 Plan A M.S. degree course requirements**

A minimum of 44 credits of graduate level work must be completed within six (6) calendar years. Plan A M.S. students are required to complete the 12 hour core described for the doctoral program, and six (6) hours of graded electives. Plan A M.S. students will enroll in Microbiology seminars (MICRBIOL 8899 and MICRBIOL 7899) throughout their program and must make at least one

presentation in MICRBIOL 8899. A maximum of six (6) credits may be transferred from other programs to satisfy the 44 minimum credit requirement. Students deciding to complete the Plan A M.S. will enroll in MICRBIOL 7999 (Research in Microbiology – M.S. Thesis). Decisions concerning transfer of credits are the responsibility of the Graduate Studies Committee.

A GPA of 3.0 must be maintained and a grade of B or better must be received in each class to be counted toward the course requirements. Students receiving 2 Unsatisfactory (U) grades in MICR 7998 or 7999 are denied further registration in the Program.

## **7.1.2 Plan A M.S. degree examination**

### **M.S. Thesis**

A Plan A Master's program requires a written Thesis based on the student's research. The format and composition of the Thesis is determined in consultation with the Advisor and Advisory Committee. The student's M.S. Advisory Committee must have at least one week to review the Thesis and the committee must agree unanimously that the dissertation is satisfactory before the student may proceed to the Oral Examination.

### **Oral Examination**

The final examination is an oral examination lasting approximately two hours. It is an oral defense of the student's Thesis but questions may be asked both in the student's area of interest and in more general aspects of Microbiology and related areas. The committee must unanimously agree that the student's performance was satisfactory for the student to pass.

It is the responsibility of the student to contact the Graduate School and obtain the proper documents and applications for the M.S. exam.

## **7.2 Non-thesis M.S. degree (Plan B)**

The Plan B M.S. degree is a non-thesis degree as the student will not have completed a research project. These students meet with the Graduate Studies Committee Chairperson, or an Advisor recommended by the Graduate Studies Committee Chairperson, to plan the completion of the M.S. requirements. The Graduate Studies Committee Chairperson also assembles an examination committee consisting of 3 faculty members (category M or P faculty which includes the M.S. advisor) for the student's exit examination when all program requirements have been met.

### **7.2.1 Plan B M.S. degree course requirements**

A minimum of 44 credits of graduate level work must be completed within six (6) calendar years. Plan B M.S. students are required to complete the 12 hour core curriculum described for the doctoral program and six (6) hours of graded electives. Plan B M.S. students will enroll in Microbiology seminars (MICRBIOL 8899 and MICRBIOL 7899) throughout their program and must make at least one presentation in MICRBIOL 8899. A maximum of six (6) credits may be transferred from other programs to satisfy the 44 minimum credit hour requirement. Decisions concerning transfer of credits are the responsibility of the Graduate Studies Committee.

### **7.2.2 Plan B M.S. degree examination**

The student must pass a final Written Examination and a one- to two-hour Oral Examination for the

Plan B M.S. degree. The advisor for a Plan B student is appointed by the Graduate Studies Committee Chairperson and is a Graduate Faculty member of at least Category M Graduate Faculty status in the student's area of interest.

### **Written examination**

The Written Examination takes the format of a mini-review on a topic area identified by the student's advisor. The document will have a minimum length of 12 single spaced pages with font and margin limits as described in the NIH grant submissions (see [Candidacy Examination](#) section). Students may also petition the Graduate Studies Committee Chairperson and their advisor requesting an alternative Written Examination in the form of a comprehensive examination on topics related to the student's interests and general subject of Microbiology. This exam will be generated by the student's Advisor and will be a minimum of four (4) hours in duration.

### **Oral examination**

The oral examination will cover topics presented in the Written Examination and may include questions dealing with more general aspects of Microbiology and related areas. The Master's Examination Committee consists of the student's advisor as Chairperson and two other Category M or Category P Graduate Faculty members from the Program. The members of the student's Advisory Committee may serve on the Examination Committee. The committee must unanimously agree that the student's performance was satisfactory for the student to pass.

## 8 Satisfactory Progress and Academic Probation

Satisfactory progress toward completion of the Plan A Masters (Thesis-Masters) and the Ph.D. degrees requires evidence of sustained progress in research, as measured by Satisfactory (S) grades in MICRBIOL 7899, MICRBIOL 8899, and MICRBIOL 7998 or MICRBIOL 8999, and completion of required course work.

Graduate students in all programs must maintain an overall B (3.0) average. Only those courses in which the student has earned a grade of B or better are counted toward the program requirements. If a student's GPA falls below 3.0, the student is considered to be on academic probation even if formal notification has not been received from the Graduate School. As outlined in Section 5 of the Graduate School Handbook, the Graduate School formally places a student on academic probation when the student has a cumulative point hour ratio (CPHR) of less than 3.0 and the student has attempted nine or more hours of graduate credit. However, the Department of Microbiology considers a student to be on academic probation when the student's CPHR is below 3.0, regardless of the number of credit hours attempted by the student. At the beginning of the first semester of academic probation the record of the student will be reviewed by the Graduate Program subcommittee and the student informed of the actions which will be taken if the student does not attain a 3.0 CPHR by the end of the semester.

In the situation a grade below B is received for any of the core or elective courses, the student will be required to repeat the course or receive a B or higher grade in a suitable alternative course that must be previously approved by the student's Advisory Committee.

During each semester of academic probation the Graduate Program subcommittee will review the student's record. The student's advisor should attend these meetings. If the committee feels that sufficient progress has been made in restoring the student's CPHR to 3.0, the student will be allowed to continue in the program. In accordance with the Graduate School Handbook, the Graduate Program will deny GTA support to students on probation. A letter to the Graduate School will be required from the Advisor or the Graduate Studies Chair to justify continued funding of the student during the probationary time (as a GTA or GRA, Fellow, etc.). Reinstatement of support may be approved when the student attains a CPHR of 3.0 or better.

Most importantly, students who have not returned to good standing after one semester will be reviewed by the Graduate Program Subcommittee. The student will also be notified by the Graduate School if they are not making "reasonable progress" towards their degree. Further, a student may then be dismissed from the graduate program if s/he fails to restore their CPHR to 3.0 within two semesters of being placed on probation, or if s/he is placed on probation for any two semesters before completing the Candidacy Exam. More information on academic probation may be found in [section 5 of the Graduate School Handbook](#).

## 9 Admission to the Graduate Program

Potential students apply to the Microbiology Graduate Program, not individual laboratories. Individual faculty may recruit students to their lab, but the potential student must also complete application materials for admission to the Microbiology graduate program.

### 9.1 Requirements

#### 9.1.1 Coursework

A four-year U.S. baccalaureate degree or its equivalent is required, with at least a 3.0 GPA. The following courses, offered at OSU or courses offered at other institutions that are equivalent in content, are prerequisites to enter the program:

- Calculus (e.g., MATH 1156)
- General Physics (e.g., PHYSICS 1200 & 1201)
- General Chemistry (e.g., CHEM 1210 & 1220)
- Organic Chemistry (e.g., CHEM 2510 & 2520)
- Biochemistry (e.g., BIOCHEM 4511)
- General Biology (e.g., BIOL 1113 & 1114)
- General Microbiology (e.g., MICRBIOL 4100)

The Graduate Studies Committee decides if academic deficiencies exist at the time of a student's admission. Courses assigned to remedy deficiencies are an additional part of a student's program and do not replace other course requirements.

#### 9.1.2 Graduate Record Examination

All applicants must take the Graduate Record Examination (GRE); additional subject tests can be taken but are not required.

#### 9.1.3 English Proficiency

The Test of English as a Foreign Language (TOEFL) is required for all students whose native language is not English.

After admissions, the [Oral Proficiency Assessment](#) (OPA) is required for students whose native language is not English as well as students from Puerto Rico, other non-English-speaking U.S. territories, and some Caribbean countries not required to take the TOEFL, e.g., Trinidad and Tobago, and Jamaica.

A passing grade in the OPA is required for a student to receive support as a GTA. Students with lower OPA scores must take courses for improvement and have their spoken English ability certified by the OSU Spoken English Program.

### 9.2 Application Procedure

Applicants must submit a formal application to be considered for admission to the program.

Application materials and submission can be completed online (preferred) at <http://gpadmissions.osu.edu/> or packets can be obtained from the Graduate Admissions Office, First Floor, SAS Building, 281 Lane Ave, Columbus, OH 43210

Completed applications should be received by December 1. Applications received after this deadline are not guaranteed review and will not be considered for any University fellowship programs.

## 9.2.1 Required application materials

A formal application consists of:

1. The nonrefundable application fee (paid to the graduate school by credit or debit card)
2. A completed application form
3. Two (2) certified copies of transcripts or record of marks for each university-level school attended.
  - Include English translations of all foreign documents.
4. Official GRE General Test scores
5. Official TOEFL scores, if applicable
6. A statement of intent (statement of purpose)
7. Three (3) letters of recommendation written on recommenders' original letterhead stationery, accompanied by completed Ohio State Reference Forms.

Items 2 to 6 are uploaded or sent to the Graduate Admissions Office. When possible, a PDF copy or photocopies of the application should be sent to Graduate Admissions in the Department of Microbiology to facilitate processing of the application

- email: [micro.grad@osu.edu](mailto:micro.grad@osu.edu)
- postal mail: 105 Biological Sciences, 484 W. 12th Ave. Columbus, OH 43210

Items in 7 should be uploaded through the online application, but can also be sent to the Graduate Admissions.

## 9.3 Application Review

All application materials are made available to faculty of the Graduate Program. Applications are formally reviewed by members of the Graduate Studies Committee. Applications are evaluated comprehensively, without any one criterion forming the basis of review. In addition, personal interviews with applicants may be conducted either in person or via video conferencing with members of the Graduate Studies Committee.

## 9.4 Admissions Decisions

Selection of applicants for admission is based on evaluation of all application materials and majority opinion of the members of the Graduate Studies Committee. In addition, input from graduate student and faculty members of the department will be considered.

The number of applicants admitted varies each year based on availability of positions in the faculty members' laboratories and funding resources.

## 4.2.6 Sample Graduate Course Schedule

### Year 1

#### Autumn Semester – 12 credits

MICRBIOL 6010: Principles of Microbiology	2 cr
MICRBIOL 6020: Microbial Physiology and Biochemistry	3 cr
MICRBIOL 7600: First Year Student Orientation	1 cr
MICRBIOL 6789: Research Principles and Techniques in Microbiology	4 cr
MICRBIOL 7899: Microbiology Colloquium	1 cr
MICRBIOL 8899: Seminar in Microbiology	1 cr

#### Spring Semester – 12 credits

MICRBIOL 5161/6155/6080 Selection 1*	3 cr
MICRBIOL 5161/6155/6080 Selection 2*	3 cr
MICRBIOL 6789: Research Principles and Techniques in Microbiology	4 cr
MICRBIOL 7899: Microbiology Colloquium	1 cr
MICRBIOL 8899: Seminar in Microbiology	1 cr

\* available classes

MICRBIOL 5161: Bioinformatics and Molecular Microbiology

MICRBIOL 6155: Microbial Ecology and Evolution

MICRBIOL 6080: Advanced Microbial Genetics

#### Summer Term – 4 credits

MICRBIOL 7998: Research in Microbiology	4 cr
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### Year 2

#### Autumn Semester – 12 credits

Elective Courses	5-6 cr
MICRBIOL 7998: Research in Microbiology	4-5 cr
MICRBIOL 7899: Microbiology Colloquium	1 cr
MICRBIOL 8899: Seminar in Microbiology	1 cr

#### Spring Semester – 12 credits

Elective Courses	5-6 cr
MICRBIOL 7998: Research in Microbiology	4-5 cr
MICRBIOL 7899: Microbiology Colloquium	1 cr
MICRBIOL 8899: Seminar in Microbiology	1 cr

#### Summer Term – 4 credits

MICRBIOL 7998: Research in Microbiology	4 cr
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## Years 3 and beyond

Pre-candidacy – Autumn/Spring 12 credits per semester

MICRBIOL 7998: Research in Microbiology	10 cr
MICRBIOL 7899: Microbiology Colloquium	1 cr
MICRBIOL 8899: Seminar in Microbiology	1 cr

Post-candidacy – Autumn/Spring 3 credits per semester

MICRBIOL 8999: Research in Microbiology	1 cr
MICRBIOL 7899: Microbiology Colloquium	1 cr
MICRBIOL 8899: Seminar in Microbiology	1 cr

Post-candidacy – Summer Term 3 credits

MICRBIOL 8999: Research in Microbiology	3 cr
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## Graduate Elective Courses

The following is a list of acceptable courses to fulfill the elective requirements of the Microbiology graduate degree. This list is not exhaustive; other classes suitable to the student's interests and research project can serve as elective courses with the approval of the student's Advisory Committee.

Course Number	Course Title	Credit Hrs	Term*
MICRBIOL 5147	Eukaryotic Pathogens	3	Au
MICRBIOL 5155	Environmental Microbiology	3	Au
MICRBIOL 5270	Antibiotics and Natural Products	3	Sp
MICRBIOL 6797	Study at a Foreign Institution	1-17	
MICRBIOL 6798	Study Tour at a Domestic or Foreign Institution	1-17	
MICRBIOL 7010	Cellular and Molecular Immunology	3	Sp
MICRBIOL 7060	Advanced Topics in Molecular Microbiology	2	Sp
MICRBIOL 7070	Antibiotics	3	Sp
MICRBIOL 7536	Advanced Food Microbiology	2	
MICRBIOL 7724	Molecular Pathogenesis	3	Au
MICRBIOL 8050	The RNA World	2	Au
MICRBIOL 8193	Individual Studies	1-5	Au,Sp
BIOCHEM 5613	Biochemistry and Molecular Biology I	3	Sp
BIOCHEM 5614	Biochemistry and Molecular Biology II	3	Au
BIOCHEM 5615	Biochemistry and Molecular Biology III	3	Sp
BIOCHEM 6761	Advanced Biochemistry: Macromolecular Structure and Function	3	Au
BIOCHEM 6762	Advanced Biochemistry: Enzymes	1.5	Sp
BIOCHEM 6763	Advanced Biochemistry: Membranes and Lipids	1.5	Sp
BIOCHEM 7770	Advanced Biochemistry: Protein Engineering	2	Sp
BIOCHEM 8900	Advanced Biochemistry: Biomolecular NMR	2	
MOLGEN 5623	Genetics and Genomics	2	Sp
MOLGEN 5630	Plant Physiology	3	Au
MOLGEN 5700	Systems of Genetic Analysis	3	Au
MOLGEN 5701	DNA Transactions and Gene Regulation	4	Au
MOLGEN 5705	Advances in Cell Biology	2	Sp
MOLGEN 5715	Developmental Genetics	2	Sp
MOLGEN 5735	Plant Biochemistry	3	Sp
MOLGEN 5796	Current Topics in Signal Transduction	2	
MOLGEN 7741	Molecular Biology and Pathogenesis of Viruses	4	Au
MOLGEN 7807	Gene Expression: Post-transcriptional Control	3	Sp
EARTHSC 5194	Group Studies-Geomicrobiology	3	Au

\* Typical term in which the course has been taught. Check the OSU Class Search for current course offerings