

**GRADUATE HANDBOOK  
DEPARTMENT OF BIOLOGY  
COLLEGE OF WILLIAM AND MARY  
2018-2019**

**Guidelines and Requirements for the M.S and M.A. Degrees in Biology**

## **I. INTRODUCTION**

The goals of the Biology graduate program are to:

1. Generate a productive academic community of students dedicated to performing high quality, publishable research within a two-year program
2. Produce graduates with both specialized training in their chosen sub-disciplines as well as communication skills to effectively function within a broad-based scientific community
3. Equip students with a range of research and teaching proficiencies that will significantly enhance their scientific or professional career opportunities.
4. Foster close academic interactions between faculty and graduate students.

## **II. TYPES OF GRADUATE PROGRAMS**

Students may obtain a graduate degree in biology by completing either a M.S. thesis research program or, under special circumstances and with the consent of the Biology Graduate Committee, a M.A. non-thesis program. Many of the requirements listed in this handbook also appear in the Graduate Arts and Sciences Catalog. Incoming students should familiarize themselves thoroughly with all applicable regulations and begin planning their programs accordingly. Any questions concerning the interpretation of a specific requirement should be addressed to the Director of Graduate Studies. The Director of Graduate Studies and the Graduate Committee will assist in any way possible, but the final responsibility for meeting all requirements rests solely with the student.

### **a. M.S. Thesis Research Program**

A M.S. degree requires 30 credit hours of courses numbered in the 500s and 600s. A cumulative grade average of 3.0 or better must be earned for all degree-counting courses, with no course grade below B-. Within the 30 credit hours, every student must successfully complete BIOL 601 (Introduction to Graduate Studies) during their first year in the program and must also register for at least one credit of Research Seminar (BIOL 682). Typically students take 1 credit BIOL682 during each of their first three semesters, all of which count toward the required 30 credit hours. In addition, 9 credits of BIOL 695 (Graduate Research) and 6 credits of BIOL700 (Thesis) are required. BIOL700 is general taken in a student's last semester.

Every student is strongly encouraged to complete all course requirements (except the 6 credits of BIOL700) by the end of their third semester. Once students have completed their coursework (totaling 24 degree-counting credits), they can register as "Research Graduate Students" whereby they are charged for only a single credit hour of tuition. Students with this status must register for 12 credits of BIOL 700 (Thesis) (see details in section V, Registration and Tuition).

With the approval of the thesis committee, a student may take courses in other departments or schools at the College but the credit hours may not total more than 6 of the 15 course credits required. With similar approval, a student may take courses numbered in the 400's or lower but such courses will neither count toward the minimum coursework requirement nor toward the upgrading of provisional status.

The student must also complete and successfully defend his/her thesis. Successful completion of a thesis will normally involve a two-year effort resulting in the production of a piece of original research which is of publishable quality and acceptable to the thesis committee. Research experience is an integral part of the thesis program. Its primary function is to teach, first-hand, how biologists gather, interpret, and publish data. Research generally involves:

1. Scholarship, that is, the critical analysis of information provided by other investigators.
2. Original research through observations, field studies, controlled laboratory experimentation, or the development of predictive theory.
3. The dissemination of research results, typically by publication in a peer-reviewed journal. In the case of thesis research, the written thesis forms an essential part of the dissemination process. Students are also strongly encouraged to present their thesis research at the annual Graduate Student Research Symposium organized by the College.

To complete the program in a timely manner, most students choose a research advisor before starting the program. M.S. students matriculating in the fall should commit to a research adviser, who must be a member of the Biology Department, by Nov. 1<sup>st</sup> of their first semester. In consultation with his/her adviser, a student also selects at least two additional department faculty who, along with the adviser, will form the student's thesis committee. When appropriate, additional committee members from within or outside the department may be added. For students matriculating in the fall, the members of the thesis committee must be selected by Nov. 15<sup>th</sup> and the Thesis Committee Designation Form should be submitted to the Biology Office by this date. The thesis topic must be selected by the beginning of the second semester of graduate work. For students matriculating in a spring semester, a schedule for research advisor and thesis committee selection, as well as thesis committee meetings and comprehensive exam dates (see below) must be developed by the student in consultation with their likely research advisor and approved by the Director of Graduate Studies.

The commitment between a student and thesis adviser is by mutual consent. However, the program recognizes that student interests can change. Students wishing to switch advisors should consult both the present and potential advisor, along with the Director of Graduate Studies, to ensure an amicable transition to the new research focus. Such changes require approval of the Graduate Committee after the first semester in residence.

Following approval of the thesis committee by the Director of Graduate Studies, each student must hold a first committee meeting by the end of the first semester or by the first week of their second semester in the program. At or before this meeting, the student should provide the committee with a draft prospectus of the research project. The committee will discuss the proposed research project and assess the student's level of preparation. In addition, the date and format for the student's Comprehensive Examination will be determined (see below). A record of this meeting including the accepted prospectus shall be filed in the student's permanent department folder.

The committee will meet again, before the end of the second semester, to administer and assess the student's performance on the Comprehensive Exam. For students matriculating in the fall, the Comprehensive Exam must be either passed, or passed conditionally, no later than May 30<sup>th</sup> of their second semester. Students can petition the Director of Graduate Studies, by letter, to nominate a delayed date for their Comprehensive Exam if there are extenuating circumstances (e.g., illness). A record of the Graduate Comprehensive Exam feedback form must be placed in the student's file.

The student and Thesis Committee will meet formally at least once every semester thereafter to monitor the student's progress. A record of these meetings should be summarized on the Thesis Committee Meeting Evaluation Form, which should also be added to the student's file. It is the student's responsibility to arrange these meetings and to maintain communication with their committee.

The following table summarizes the expected timeline of progress for M.S. students matriculating in a fall semester. M.A. students must also complete their Comprehensive Exam following the same schedule. For students matriculating in a spring semester, a schedule for research advisor and thesis committee selection, as well as thesis committee meetings and comprehensive exam dates must be developed by the student in consultation with their likely research advisor and approved by the Director of Graduate Studies.

<b>Timeline:</b>	<b>Student activity/responsibility</b>
Nov 1 <sup>st</sup> (for fall matriculation)	Commit to a specific research advisor
Nov 15 <sup>th</sup> (for fall matriculation)	Selection of thesis committee and submission of thesis committee designation form to Biology Office
By first week of 2 <sup>nd</sup> semester	Hold first committee meeting following Director of Graduate Studies' approval of the committee membership. Commitment should agree on the format of Comprehensive Exam
May 30 <sup>th</sup> (for fall matriculation)	Comprehensive Exam passed, or passed conditionally
By end of 3 <sup>rd</sup> semester	Third thesis committee meeting
By end of 4 <sup>th</sup> semester	Fourth thesis committee meeting

Failure to meet the timeline indicated in this handbook will result in the student being moved to probationary status. A probationary student cannot hold a Teaching Assistantship. All deadlines can be appealed, by letter, to the Director of Graduate Studies if there are extenuating circumstances.

A major component of the M.S. program is research. After completion of the research project, the student must prepare a written thesis to be submitted to the Arts and Sciences Graduate Program upon the approval of the thesis committee. Formatting instructions for theses can be found on the College's Arts and Sciences Graduate Program web site. These instructions change from time to time, so students should not rely on previous theses as formatting guides. Title page of thesis needs to be approved by Office of Graduate Research and Studies before being signed off by committee. The student must defend the thesis by presenting a formal seminar to the department, followed by an oral examination conducted by the thesis committee. The department must be notified one week prior to the date of the thesis seminar. A final draft of the thesis should also be presented to the thesis committee at least one week prior to the seminar. During the semester in which the thesis will be defended, the student should register for 12 credits of BIOL 700 Thesis.

## b. M.A. Non-thesis Program

Under special circumstances and with the consent of the graduate committee, students may obtain an M.A. degree in biology. M.A. students must complete 32 semester hours of courses, at least 20 of which must be numbered in the 600s. Each student must achieve a cumulative grade point average of 3.0 or better on a 4.0 point scale in all courses undertaken for graduate credit at the College of William & Mary after admission to the graduate program. No credit toward a degree will be allowed for a course in which a student receives a grade below "C" (grade point = 2.0).

Within the 32 credit hours, non-thesis students must successfully complete BIOL 601 (Introduction to Graduate Studies) during their first year in the program. At least one (up to a maximum of 3) of the 32 credits must be for BIOL 682 (Research Seminar). Non-thesis students cannot receive credit for 700 level courses. However, they can take up to a total of 3 credits for research, as BIOL 690 (Problems in Biology). Non-thesis students must also pass a Graduate Student Comprehensive Examination.

As with students in the M.S. track (see above), M.A. students may take a limited number of courses in other departments for up to a maximum of 12 semester hours. Non-thesis students must seek permission from the Graduate Committee prior to registering for such courses. Non-thesis students should choose a faculty member as an adviser with whom they can consult on a regular basis. M.A. students must meet the same requirements as M.S. students regarding Research Seminar (BIOL 682), seminar attendance and the Comprehensive Examination (see below).

## **III. GENERAL RESPONSIBILITIES**

In addition to completing the required coursework and thesis research outlined above, there are additional responsibilities all graduate students must meet.

1. To ensure some familiarity with all of the major sub-disciplines of biology, we require our graduate students to complete, if they have not already done so, a balanced program of study consistent with the requirements we have established for William and Mary undergraduate biology majors (see the undergraduate catalog). In particular, student must have at least one semester of organic chemistry either as an undergraduate or during their graduate program. Additional semesters may be preferable depending on a student's career goals. Any additional credits in this area cannot be applied toward semester hours of graduate courses numbered in the 500's or 600's required for the M.S. or M.A. degrees. Prior to registering for the first semester, students should review their undergraduate record in light of these requirements and then consult with the Director of Graduate Studies or an assigned adviser to plan their coursework program. In some cases, deficiencies may require enrollment in courses which will not be awarded graduate credit.

2. Graduate students may not repeat courses they successfully completed during their undergraduate program at this or any another institution. Decisions relating to this matter will be made by the Graduate Student Committee.
3. An overall 3.0 average must be maintained in all courses taken for graduate credit and no credit will be awarded for grades lower than 2.7 (B-). Regular students who drop below a 3.0 average will be given a one-semester probationary period to bring up their average. Failure to attain a 3.0 cumulative average, with a course load of at least 6 credits, by the end of the following semester will result in dismissal from the program. Provisional students who do not achieve a 3.0 average in their first semester are subject to immediate dismissal, with no probationary period. A provisional student will receive regular status after the completion of 7 graduate credits with a 3.0 average.
4. Although students are required to register for a minimum of one credit of BIOL 682 (Research Seminar), they are strongly encouraged to attend and actively participate in Research Seminar for at least 3 semesters. BIOL682 is designed to be an integral part of the graduate program, one which allows students to present to their peers their research or a current scientific issue as discussed in the primary literature.
5. A change in program from an M.S. to an M.A. may be made only upon prior approval of the Graduate Committee. This change may require repayment of any funds received by the student from either the College or the Adviser in support of their summer research.
6. All students are expected to attend and participate in the Department's seminar programs as well as attend meetings with invited seminar speakers.
7. All M.S. students are expected to actively seek grant funding to support their research. There are many internal (i.e. within William and Mary) and external sources of funding indexed on the program's Blackboard site, as well as resources available through the College's Office of Grants and Research Administration and The Graduate House. While most faculty will be able to provide financial support for graduate student projects, it is the graduate students' responsibility to ensure they have appropriate funding for their intended thesis project.

#### **IV. COMPREHENSIVE EXAMINATION**

The purpose of the Graduate Student Comprehensive Exam is to ensure that all students have a basic knowledge of general biology and, for M.S. students, more advanced knowledge in the area of their thesis topic. During the first semester of the first year of graduate studies, M.S. students should select a thesis adviser as well as a thesis committee consisting of at least two additional members from the Biology

Department. Additional committee members can be faculty from outside the department. Deadlines for forming this committee and specifying the format of the Comprehensive Exam are described earlier in this handbook. The Comprehensive Exam should be tailored to the individual student's needs and research specialty.

The following flexible format is to be used as a starting point for designing Comprehensive Exams for M.S. students. It should be noted that students, advisers, and committee members should use these suggestions as a starting point for the exam. Additional requirements can be put on the student as deemed necessary by their examining committee. The format of the exam must be developed in conversation with the student and the whole committee. Also, the examining committee must be the same as the thesis committee (except in extenuating circumstances) and must include two members from the biology faculty in addition to the primary thesis advisor.

### **Core components:**

Demonstration of Adequate Breadth of Basic Biology. M.S. students must demonstrate that they have the necessary background to be able to place their research and advanced course work into the context of basic biological knowledge. Therefore, at the time of their second committee meeting (i.e. by 4 weeks into their second semester) each student should be given a list of up to 4-5 basic biology topics by each committee member. The student can be asked questions about these topics during the Comprehensive Exam, and each student must satisfy the majority of the committee that they have sufficient knowledge of these areas.

Defense of the Thesis Proposal. A major function of the Comprehensive Exam is to ensure that the M.S. student has developed a robust proposal that will yield an acceptable thesis. Each student must hand each member of their thesis committee a copy of their written thesis proposal at least two weeks before the exam. In the exam, each student must give a brief presentation (approximately 15 minutes) about their proposal and then the thesis committee will examine the student on various aspects of the proposal. The student must satisfy the majority of the thesis committee that their proposal is satisfactory for progression in the program. Ideally, this latter part of the exam will turn into a productive committee meeting focused on fine-tuning the student's thesis proposal.

### **Common but variable components:**

Presentation and Critique of a Published Manuscript. One of the key skills that MS students must develop and exhibit at the Comprehensive Exam is their ability to critically evaluate primary literature. Each student, in collaboration with their advisor, will select a published paper that the student will present for approximately 5 minutes during the exam. The committee will then examine the student orally for a further 15 minutes (approximately) to test the student's ability to critically evaluate the paper. The student must pass this part of the exam to the satisfaction of the majority of the committee.

Students are advised to choose a manuscript that is fundamental to their proposed research project.

Presentation and Discussion of Research Data: Mastery of the technical skills required to carry out experiments and the analytic skills to interpret the data is key to a student's successful completion of a research thesis. Thus for many students, one important element of the comprehensive exam is that the student will present and discuss their experimental results to date, even if the findings remain preliminary. The committee will assess the student's progress in mastering the essential technical skills as well as their understanding of what can or can't be concluded from their results.

### **Logistics:**

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Each exam lasts approximately two hours. The Comprehensive Exam has four outcomes: (i) Pass; (ii) Provisional Pass, if additional requirements stipulated by the examining committee are met by a designated date; (iii) Not Passed, but the student can retake the exam by a specified date; (iii) Fail and dismissal from the program. The result of the exam will be communicated to the student immediately following the meeting, and any additional work and timelines must be specified at that time. Failure to meet additional timelines and requirements will result in the student being moved to probationary status.

For M.A. students there will be an exam of a more general nature administered by a committee composed of the student's advisor and two additional Biology faculty members. The exam should include the elements described above, except for the "Defense of the Thesis Proposal".

For both the M.S. and M.A. students the committee members will decide, based upon the results of the exam, what further action (which may include additional coursework, re-examination or dismissal) might be required.

## **V. REGISTRATION AND TUITION**

To remain in good standing, all students must maintain continuous enrollment during regular semesters until the degree is awarded (summer registration is not required).

A M.S. student who has completed all degree requirements except for the 6 credits of BIOL 700 (Thesis) is eligible to register as a "Research Graduate" student for 12 credit hours of BIOL 700 Thesis while paying for only one credit in tuition. Research students are considered full time students for all purposes. Full time status is generally necessary to prevent student loans from coming due and for coverage on parents' insurance plans.

A low-cost alternative to the research designation, GRAD 999, is also available for students who have completed all of their requirements except the thesis. With prior



approval from the Graduate Committee, students in good standing can remain active in the M.S. program with Continuous Enrollment Status by enrolling in GRAD 999 only and by paying the “Continuous Enrollment Fee” (the fee for the 2018-2019 academic year is \$150 per semester). The following categories of students are NOT eligible and should register as Research Graduate students:

- a. Students employed in a graduate student appointment (e.g., Teaching Assistant, Research Assistant)
- b. Students who choose to continue to defer repayment of student loan or retain coverage on their parent’s insurance
- c. International students requiring visas should seek guidance from the Reves Center to determine if they can enroll in GRAD 999.

Exceptions to the continuous enrollment policy involving a formal leave of absence may be granted, but only for reasons beyond the student’s control, subject to approval by the thesis adviser, department Graduate Committee and the Dean. Students who are involved with research, or who wish to continue to use College facilities in any way, or to consult with faculty (including the adviser), will not be eligible for a leave of absence.

The College requires payment of full tuition by anyone registering for 9 or more credits. However, satisfactory progress in course work can be maintained by registering for fewer than 9 credits each semester. Therefore, students not receiving tuition waivers may be able to minimize expenses by registering as part-time students and paying tuition on a per-credit basis.

## **VI. FINANCIAL AID**

The department offers a number of teaching assistantships which provide a stipend as well as remission of tuition and all fees. Students offered assistantships at the time of their original acceptance into the program will be eligible for four consecutive semesters of such support as long as they remain in good academic standing and otherwise satisfactorily fulfill all obligations. In addition, students awarded an assistantship at the time of their original acceptance who are pursuing the M.S. track will often receive summer support; this money may need to be returned to the department if the student later changes to the M.A. program.

The length of time during which support is provided to those students who are offered an assistantship at a later stage in their program will be subject to departmental needs at that time. Continuing students without teaching assistantships may re-apply for a TA and provide additional information and letters of recommendation to the Director of Graduate Studies in support of their application.

Overall performance of all teaching assistants will be evaluated at the end of each semester. Students who are placed on probation or whose performance as a teaching assistant is substandard are subject to loss of the assistantship.

No student receiving a teaching assistantship may register for more than 12 credits of course work per semester. Teaching assistants must attend all lectures, laboratories, grading sessions, and preparatory meetings required of them by the course instructor. Because of the full-time commitment inherent in their coursework, teaching, and departmental obligations, teaching assistants are not permitted to be paid for additional work during the academic year.

Students who pursue a M.S. degree should expect to receive summer support from their advisor's grant funds. Those holding a teaching assistantship, can also receive a summer stipend from the College, provided they are working on their thesis research throughout the entire summer. Students desiring support from the College must submit to the Graduate Committee a description of the proposed summer research. This funding application must be approved and signed by the thesis adviser prior to the initiation of the summer program. Thesis students who are not on a teaching assistantship may also receive summer support subject to availability of funds. Other financial aid to students may involve faculty grants or part-time employment on an hourly basis in the department.

## **VII. PROGRESS IN THE PROGRAM**

Sustained progress toward the degree is valuable to the student, to the faculty, and to the College as a whole. Failure to meet the timeline described earlier will result in a student being moved to probationary status and may, subsequently, result in dismissal from the program. This handbook outlines a two year program, with students finishing all degree requirements by the end of their fourth semester. It is especially important that M.S. students make substantial progress on research during the first summer, if not before. This, in turn, requires careful planning, thinking and discussion in the first two semesters in residence. All students are strongly urged to make every effort to adhere to this timetable.

It is the student's responsibility to ensure that all forms are completed on schedule.

Appeal of provisions of this handbook may be made in writing to the Director of Graduate Studies, who will discuss each case with the Graduate Committee. Consideration of such appeals by the full Biology Department Faculty may be appropriate.