

WCU

Department of Biology

Graduate Program Handbook

2020-2021

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## **Master of Science**

### Introduction

The procedures and advice that follow are intended to provide both graduate students and faculty with guidelines for completion of the MS Degree. The document was prepared, and will be periodically updated, by the Graduate Committee. In all instances, WCU policy will supersede policy in this handbook.

### Program Objectives

The program is meant to provide exposure to a range of concepts and techniques in modern biology at the graduate level and is intended both for students seeking professional development and positions requiring Masters-level education.

### General and Course Requirements

The Graduate Catalog in effect at the time of admission determines prerequisites for admission and course requirements. Four core courses (= 12 credits) are required. Graduate Seminar in Biology (BIO 510) introduces students to the program and covers important graduate-level skills including information literacy, giving presentations, the peer-review process, and grant writing. Experimental Design and Analysis (BIO 511) explores the design and analysis of biological research. Topics and Research Methods in Cellular, Microbial, and Molecular Biology (BIO 520) and Topics and Research Methods in Ecology, Evolution, and Organismal Biology (BIO 521) expose students to currently relevant topics and technical skills. Students also take 15 elective credits with input from their Graduate Advisor and Committee. Students also complete a research project by taking Directed Research in Biology (BIO 591) under the direction of a Department of Biology faculty member who serves as the student's Advisor as described below.

Additional courses are selected with input from the Graduate Coordinator, until a Graduate Advisor is chosen. Of the 30 credits required for the degree, all are ideally taken at the graduate level (up to six credits can be at the 400-level) and at least 24 must be in Biology, including all core courses and BIO 591. Undergraduate prerequisites to the program, or to any of the graduate courses selected, cannot be applied to the degree. BIO 608, 609, and 610 are reserved for students opting to complete a thesis, and may not be counted toward the degree. It is important that the student meet early on in the program with the Graduate Coordinator to develop a plan for taking courses when they are available. This should be done in the first semester.

### Advising Sheets and Forms

Advising sheets and checklists useful for planning program progression can be found in the Appendix and the Department of Biology website at: <https://www.wcupa.edu/sciences-mathematics/biology/grad.aspx>. Graduate forms can be found on the Graduate School website.

### Completion of Prerequisites to Full Matriculation

At the time of acceptance into the program, any deficiencies (e.g., incomplete program prerequisites) not completed before admission are noted by the Graduate Coordinator in the student's file. The Coordinator reviews these at a first meeting with the student (usually during the first semester), and includes any remaining deficiencies in the plan of study timetable. The student should complete all deficiencies in a timely manner, usually by the end of their first year. It is the student's responsibility to make sure that all deficiencies are rectified by any given deadline. The Advisor should note that full matriculation has been attained on the MS Student Progress Checklist (Appendix).

### Degree Candidacy

Fully matriculated students should apply for candidacy once 12 to 15 credits of course work has been taken. Normally, candidacy is suggested before initiating the Directed Research in Biology (BIO 591) project, and is required of student's scheduling for the required Written Examination. Preconditions required include: (1) removal of all deficiencies specified by the student's Graduate Committee at its first meeting, (2) completion of 12-15 credits of graduate course work in biology, with an overall grade point average (GPA) of at least 3.0, and (3) selection of a Graduate Advisor and Committee. The Graduate Advisor should note that Candidacy has been attained on the MS Student Progress Checklist.

### Demonstration of Satisfactory Progress Toward the Degree

If at any time the student's GPA falls below 3.0, the Graduate School will place the student on probation, as described in the Graduate Catalog. The GPA must be raised to acceptable levels within the next nine credits of graduate work taken (usually the next semester) or the Graduate School will drop the student from the program. A student may also be dropped from the program without probation if the GPA falls below 2.0 or if they fail any course.

Part-time students, despite oftentimes having many outside commitments, must still ensure that they can complete the program within the mandated six year limit. The student's Graduate Committee will sometimes support a request to extend the deadline, but will do so only in cases where the student has shown substantial progress toward degree completion.

### Continuing Registration

Any student who decides not to take courses in any semester, but who still wishes to maintain active status with the Registrar must apply for continuing registration (GSR 799) through the Graduate School. The student must do this for each semester that they wish to remain active.

### Graduate Coordinator

The Graduate Coordinator advises all newly admitted students and continues to do so until the student is ready to seek a faculty member to serve as Advisor to their BIO 591 project. Thus, the Coordinator handles early questions about degree requirements, courses, and other guidance. Coordinators also keep student records and paperwork related to admission, candidacy, and degree completion. The Coordinator is also an ex officio member of all Graduate Committees and it is their responsibility to attend BIO 591 seminars in a non-voting capacity. They may also serve as an advising and voting member of a Graduate Committee when warranted.

### Graduate Advisor

Once a student has approached a faculty member to supervise their BIO 591 project, and receives their approval, they become Advisor and inform the Graduate Coordinator to note this. Their main responsibilities include helping form committees, select courses, providing lab space and/or field sites and equipment, supervision, and acting as Chair of the Graduate Committee.

### Graduate Committee

The committee should be chosen in consultation with the Advisor and consists of the Advisor and two other members from the Department of Biology. While members may give advice and guidance on the BIO 591 project, the Advisor is the supervisor. Formation should be made by the end of the third semester so that a presentation of the proposed project can be discussed for guidance. The Committee will likely not meet again until the end of the student's program, after project completion, to attend a required seminar and participate in its oral defense.

### Changes in the Graduate Committee

Occasionally faculty retirement, sabbatical leaves, or other events may necessitate the dropping or replacement of a Committee member. A member may also ask to be replaced in some instances for various personal or academic reasons. Such replacements can be made at any time, but should be made with the full knowledge of the Graduate Advisor. The Advisor should then make written notification of the change to the Graduate Coordinator.

### Switching to the Thesis Option

Changing to this option is possible, but reasons must be submitted in writing to the Graduate Coordinator if the change comes before a student has commenced their BIO 591 project, or to the Graduate Committee if working on it. The decision whether or not to grant the change will be at the discretion of the Coordinator or Committee, and their decision shall be final.

A student who switches after commencing a BIO 591 project must form a new Graduate Committee, which may contain the same faculty members as their prior one, or new ones. The new Committee must meet to plan remaining coursework, if necessary, and fill out the Committee Composition section of the MS Student Progress Checklist. If a substantial change in the student's intent or focus is the reason for the change, some courses not taken before may have to be taken. Such a decision will be left up to the new Committee.

### Directed Research in Biology Project

Students must perform a research project, about a semester-long, as BIO 591 under the direction of the Graduate Advisor. The Department of Biology Administrative Assistant, upon request from the Graduate Coordinator, adds the course for the student after the Coordinator is asked to do so by the student's Advisor. Usually the Advisor directs the project, but in some cases a student may take advantage of a research opportunity available under another faculty member outside the department. In such instances, that person must be a member of the student's Graduate Committee.

The intent of the project is to provide exposure to individually conducted research, in an area of interest to the student. At the same time, the project's scope is less than for a thesis project. The project usually contributes to research-in-progress by the advisor, but should be sufficiently discrete that the student's own accomplishments are clearly discernible. Note that in lieu of a research project, students may conduct an extensive literature search or develop the ability to use specialized techniques.

As part of BIO 591, students must also write a research paper and deliver a seminar to members of the Department of Biology, which are evaluated by the Advisor, who later assigns a grade. As the Graduate Committee also reviews concepts in the project during the final seminar, the student should have completed the project before the seminar.

### Written Examination

This examination is given at some point during the final semester, usually once all other requirements (i.e., course work and electives) are done. It consists of three essay questions, one written by each of the three Graduate Committee members. The exam is a "take home" exercise, and the student is free to use resources at their disposal to answer the questions. Questions should be relevant to the student's research project and may include discipline content, practical applications, techniques used, etc. Prior to the questions being given to the student, the Committee will discuss them. Upon finalization, the student will get them from their Advisor. The day of question receipt by the student is considered Day 1. From then the student has 30

days to complete the questions, all of which must be provided to the Advisor. The Committee members that wrote the questions will grade their question. Committee members must complete the Outcome of Written Examination section of the MS Student Progress Checklist and give it to the Graduate Coordinator before the student can graduate.

Grades for the examination are *pass*, *no pass* or *fail*. *Pass* implies that no further evaluation is necessary. If the student receives a *no pass*, further testing (as determined by the Graduate Committee) will be required to ensure adequate knowledge has been attained for granting the degree. *Fail* is reserved for rare instances where the quality of the answer is so low that it effectively removes the student from the program with no provision for further testing.

#### Directed Research Seminar

All students must perform satisfactorily in an open seminar of their BIO 591 project results, with all members of their graduate committee in attendance. Normally this occurs during the final semester, after all core and elective courses have been completed. The project should have been completed, or almost be completed, at the time of the seminar. The Graduate Coordinator also attends in an ex officio capacity. If they cannot attend, they must appoint a Graduate Committee member to act for them. Grading for BIO 591 is the responsibility of the Graduate Advisor, who is also responsible for completing online and hard copy assessments of the first and final project written paper drafts, oral communication skills demonstrated during the seminar, and information literacy skills gained across the project.

#### Online Assessment

Students must complete an assessment of their program experiences before completing BIO 591. It can be found online at <https://wcupa.edu/sciences-mathematics/biology/bookAssessment.aspx>. Contact the Graduate Coordinator for the password.

#### Exception to Graduate Policy/Regulations

At any time during their graduate career, students may request an exception to any policy discussed above. To do so, a Petition for Exception to Graduate Policy/Regulations for Graduate Students form must be filled out and then signed by the Graduate Coordinator, Chair of the Department of Biology, and Dean of the Graduate School. The Dean makes final decisions.

#### Grievances

Grievances should be handled at the lowest possible level. The student should first discuss the grievance with their graduate advisor, then if necessary with their Graduate Committee. If the grievance has not been resolved, the student should see the Graduate Coordinator and Chair of the Department of Biology. At that time, if the grievance is unable to be resolved, and Dean of the Graduate School, whose decision shall be accepted as final by the student, will hear it.

#### Graduation and Other Events of the Final Semester

It is the student's responsibility to inform the Graduate School of their intent to graduate. Deadline dates for this generally fall within the first month of the semester in which the student plans to complete their degree. The Graduate Coordinator should also be given an approximate timetable for completion of the degree at the beginning of the final semester.

## **Thesis Option**

### Introduction

The procedures and advice, which follow, are intended to provide both graduate students and faculty with guidelines for completion of the MS Degree under the thesis option. The document was prepared, and will be periodically updated, by the Graduate Committee. In all instances, WCU policy will supersede policy in this handbook.

### Program Objectives

The MS program in Biology at WCU is intended to: a) provide exposure to a broad range of concepts and techniques in modern biology at the graduate level, b) develop skills in a particular area of interest, and c) provide students with an opportunity to apply experimental design and analysis in their research. The program is intended both for students seeking positions requiring Masters-level education and for those intending to pursuing a doctoral degree. An important feature of the program for meeting objectives b and c above is the requirement of a thesis.

### General and Course Requirements

The Graduate Catalog in effect at the time of admission determines prerequisites for admission and course requirements. Four core courses (= 12 credits) are required. Graduate Seminar in Biology (BIO 510) introduces students to the program and covers important graduate-level skills including information literacy, giving presentations, the peer-review process, and grant writing. Experimental Design and Analysis (BIO 511) explores the design and analysis of biological research. Topics and Research Methods in Cellular, Microbial, and Molecular Biology (BIO 520) and Topics and Research Methods in Ecology, Evolution, and Organismal Biology (BIO 521) expose students to currently relevant topics and technical skills. Students also take nine elective credits with input from their Thesis Advisor and Committee. In addition, thesis students complete three research courses (= nine credits): Thesis Proposal (BIO 608), Thesis Research (BIO 609), and Thesis and Defense (BIO 610). Note that it is the student's responsibility to make certain that all appropriate course work needed for the degree is taken.

Full time students should take BIO 608 in their second semester and complete it by semester's end. The proposal may include a thorough literature review in the thesis topic area and any preliminary data the student may have acquired for it. Successful completion requires the proposal's approval by the student's Thesis Committee. The student then receives a grade from their Thesis Advisor, who fills out the Completion of Thesis Research section of the MS Student Progress Checklist – Thesis Option, and gives a copy of this to the Graduate Coordinator. Thesis and Defense (BIO 610) should be taken in the final semester and it is expected that the student orally defend their thesis at the end of that semester.

Each of these three research courses must be taken under the direct supervision of the Advisor with input from the Committee. Grading of the thesis is again the responsibility of the Advisor. The Advisor is also responsible for completing online and hard copy assessments of the first and final thesis drafts, oral communication skills demonstrated during the thesis defense, and information literacy skills gained across the thesis project.

Of the 30 credits required for the degree, at least 24 must be in biology. Six credits may be taken in an allied discipline with the approval of the Advisor and Committee. Undergraduate prerequisites to the program, or to any of the graduate courses selected, cannot be applied to the degree. Because many elective courses are only offered during alternate years, it is important that the student develop an overall plan for taking preferred courses when they are available. The



student should discuss the course schedule at the first meeting with their Advisor and Committee. A proposed schedule of biology course offerings is provided in the Appendix.

#### Advising Sheets and Forms

Advising sheets and checklists useful for planning program progression can be found in the Appendix and the Department of Biology website at: <https://www.wcupa.edu/sciences-mathematics/biology/grad.aspx>. Graduate forms can be found on the Graduate School website.

#### Completion of Prerequisites to Full Matriculation

At the time of acceptance into the program, any deficiencies (e.g., incomplete program prerequisites) not completed before admission are noted by the Graduate Coordinator in the student's file. The Coordinator reviews these at a first meeting with the student (usually during the first semester), and includes any remaining deficiencies in a plan of study timetable. The student should complete all deficiencies in a timely manner, usually by the end of their first year. It is the student's responsibility to make sure that all deficiencies are rectified by any given deadline. The Thesis Advisor should note that full matriculation has been attained on the MS Student Progress Checklist – Thesis Option.

#### Degree Candidacy

Fully matriculated students should apply for candidacy once 12-15 credits of course work has been taken. The following are preconditions for Admission to Candidacy for the Thesis Option: (1) selection of a Thesis Advisor and Committee, (2) removal of all deficiencies specified by the committee at its first meeting, (3) completion of 12-15 semester hours at the graduate level in biology, with an overall GPA of at least 3.0, and (4), passing performance at a meeting of the Committee to evaluate the thesis proposal. The Advisor should note that candidacy has been attained on the MS Student Progress Checklist – Thesis Option.

#### Demonstration of Satisfactory Progress Toward the Degree

Full-time students, during their first two semesters, are expected to complete four prerequisites for candidacy: (1) 12-15 hours of course work, (2) accumulation of at least a 3.0 GPA in Biology, (3) selection of a Thesis Advisor and Committee, and (4) defense of a thesis proposal to the Committee. In cases where these criteria are not met by the end of the first year, the student may be asked to meet with their Committee so that the student's progress toward the degree can be reviewed, and written recommendations can be made for course work or research during the coming (third) semester. The recommendations, in the form of a letter, would first be sent to Dean of the Graduate School for signature approval, and then to the student. If, after the third semester, the student has still not fulfilled the prerequisites for candidacy, the Thesis Committee may decide to terminate the student from the program. This would involve a second letter, also sent via to the Dean for their signature. Such a termination procedure is intended only for extreme cases, in which the student fails totally in working with any potentially suitable Advisor, or clearly shows inability to design or conduct independent research. Termination from the program on the above grounds could occur no earlier than the end of the third semester, but at any time thereafter. Ethical misconduct regarding the acquisition or presentation of data can also constitute dismissal.

If at any time the student's GPA falls below 3.0, the Graduate School will place the student on probation. The GPA must be raised to at least a 3.0 within the next semester or the student will be dropped from the program. A student may also be dropped by the Graduate School without probation if the GPA falls below 2.0 or if they fail any course.

Part-time students, because of a broad range of potential outside commitments, may require several years to accomplish the criteria leading to candidacy. Such progress is acceptable, but it is the student's responsibility to ensure that they complete all requirements for the degree within the six year period specified by the Graduate School. The Graduate Committee will sometimes support a student's request to extend the six-year deadline for program completion, but will do so only in cases where the student has shown substantial progress toward completion of the thesis.

#### Continuing Registration

A student who decides not to take courses in any semester, but who still wishes to remain active with the university must apply for continuing registration (GSR 799) through the Graduate School. The student must do this for each semester that they wish to maintain active status.

#### Non-traditional Options for Graduate Work

Full-time students are expected to take three courses each semester, and to complete their degree within two-years. Students whose schedules do not permit full-time study may nonetheless enter the program and take courses as time permits. Because of the intensive nature of thesis research, the student will usually be urged to consider full-time work toward the degree once Admission to Candidacy has been achieved. Students must complete all requirements for the degree within six calendar years of entry into the program.

Students employed by nearby companies or other institutions, which provide facilities for research, may elect to do all or a portion of their research off campus. Students who do this should receive a written assurance that the research will not be considered to be proprietary, and that it may be published and presented in an open forum. The student should take particular care to describe in detail how the research will be accomplished in the thesis proposal. Periodic progress reports should be provided to the Thesis Committee. Inclusion of an appropriate company/institution representative on the committee is advisable.

#### Graduate Coordinator

The Coordinator serves as advisor all newly incoming students and remains as such until the student is ready to seek a faculty member to serve as Thesis Advisor. Thus, the Coordinator handles early questions about degree requirements, courses, or other guidance. Coordinators also keep student records and paperwork related to admission, candidacy, and degree completion. The Coordinator is also an ex officio member of all Graduate Committees and it is their responsibility to attend BIO 610 defenses in a non-voting capacity. They may also serve as an advising and voting member of a Thesis Committee when warranted.

#### Thesis Advisor

Once admitted to the program, students must select an Advisor before the end of their second semester. To do so, students contact a Department of Biology faculty member to discuss conducting thesis-level research in their lab. Once a student receives approval from a faculty member, that person becomes Advisor and informs the Graduate Coordinator to note this. Their main responsibilities include helping form committees, select courses, providing lab space and/or field sites and equipment, supervision, and acting as the Chair of the Thesis Committee.

#### Thesis Committee

This group should be chosen in consultation with the Thesis Advisor. Members should be selected for their relevance to the student's research interests and ability to provide advice or other assistance. The Department of Biology website includes faculty research descriptions and publications and should be perused by students to help choose a Committee. The Committee

should meet at least four times. A first meeting should occur during the first semester or before the completion of nine course credits, and is intended to map out additional course work, specify deficiencies which must be remedied (i.e., reviewing deficiencies noted by the Graduate Coordinator upon admission), and to gain an initial sense of the student's research interests. The Committee Composition section of the MS Student Progress Checklist – Thesis Option is filled out at that meeting and a copy is filed by the Graduate Coordinator. The Committee meets a second time to discuss what the student will do for the thesis proposal. A third meeting is held to evaluate the student's proposal and a fourth serves as the student's thesis seminar and defense. All Committee members are expected to attend the seminar and defense, which are usually presented by the student during their final semester. At other times it is the student's responsibility to keep all Committee members informed of their research progress. So doing can save difficulty and discomfort at the defense, and is a courtesy to those who have a genuine interest in the work underway.

The Committee must consist of at least three members from the Department of Biology, including the Thesis Advisor, who serves as the Chair of the Committee. An additional member can be chosen from outside the department and can serve as Co-Chair of the Committee, if the other is a member of the department.

#### Changes in the Thesis Committee

Occasionally, faculty retirement, sabbaticals, and other events necessitate the dropping or replacement of a Committee member. A member may also ask to be replaced in some instances for a variety of personal or academic reasons. Such replacements can be made at any time, but should be made with the full knowledge of the Thesis Advisor. The Advisor should then make written notification of the change to the Graduate Coordinator.

Occasionally an Advisor may feel, for any reason, that they can no longer serve this role. In such cases, the Advisor will inform the Graduate Coordinator in writing of this change and that the Thesis Committee has been dissolved. It is then the student's responsibility to find a new Advisor and form a new Committee, usually with the Coordinator's help. The new Committee should be reconstituted at a meeting of all members present. At that meeting a new Thesis Committee Composition and Recommendations section of the MS Student Progress Checklist – Thesis Option should be filled out, and the Committee should reevaluate the thesis proposal if needed.

#### Switching to the MS

Changing out of the thesis option is possible, but discouraged. If a change is requested it must be done during the BIO 608 project. A statement outlining reasons for a change must be submitted in writing to the Thesis Committee, who will decide whether or not to grant the change. Their decision will be final. A student who has switched must then reconstitute their Committee into a Graduate Committee who will fill out the Committee Composition section of the MS Student Progress Checklist and meet to plan a new course of action. If a substantial change in the student's intent or focus is the reason for the change, some courses taken under the thesis option may not be counted toward the new degree program.

#### The Thesis Proposal

A thesis topic should be selected in consultation with the Thesis Advisor, and should generally be a subject of mutual interest. Additional considerations in the choice of a topic are as follows:

1. The research should be completed within 1-2 years. A clear description of the questions to be asked can save considerable frustration later with a topic, which, once begun, can be too open-ended to be addressed in a thesis.

2. The research must rely on equipment, facilities, field sites, etc., available to the Department of Biology, or accessible through other WCU departments or institutions.
3. The convenience and expense of the project must be considered. For example, specialized equipment required, study sites, organisms, and data obtainment should be chosen with concern given to the efficiency of project completion. All these considerations might necessitate that a reasonable timeframe be considered.

It is important that the proposal be prepared with considerable input from the Thesis Advisor and carefully scrutinized by the Thesis Committee. It should contain the following:

1. Introduction: Designed to orient the reader to the general subject, with citations of literature to be used in analyzing the research and to precisely describe any hypotheses and/or questions to be investigated by the student.
2. Pilot study: A brief summary of preliminary data could be presented, if available.
3. Methods: Proposed methods should be described as a series of experiments or field observations, with inclusion of equipment to be used and a timeframe for completion.
4. Analysis: Should explain precisely how the experiments performed or observations made will be used to evaluate the study questions and hypotheses.
5. Literature cited: All references cited in the thesis proposal should be included.

Copies of the proposal must first be submitted to each committee member, and a meeting to evaluate it is then scheduled by the student. At that meeting, the student will demonstrate both an understanding of the subject area addressed and the feasibility of the intended research. At the end of the meeting the Committee will: (1) approve the proposal as written, (2) approve the proposal with minor modifications to be made with the Thesis Advisor's guidance, and (3) require major modifications, to be evaluated at a second Committee meeting. When the proposal is approved, each Committee member will sign the Approval of the Thesis Proposal section of the MS Student Progress Checklist – Thesis Option. Copies of the checklist and proposal should then be given to the Graduate Coordinator.

### Research Funding

Funding for research and conference travel is available (but not guaranteed) from WCU. Research funds are available from the Dean of the Graduate School Research Fund. Applications may be obtained from the Graduate School. Conference travel funds are available from the Graduate Student Association (GSA). Contact the association for details. Additional funding for research may be available from the Department of Biology, Graduate Student Research Award. To apply, a student must fill out a form available from the department office. The student must attach a proposal to the form and an itemized budget with justification for each item. The Thesis Advisor must also provide a support letter for the student if they apply. There is no application deadline as a faculty Committee reviews applications on a case-by-case basis.

### Changes of Research Topic

Graduate students frequently encounter unanticipated difficulties with their intended research topic. If such difficulties require minor alterations of experimental design or research timeframe, it is sufficient to just inform the Thesis Committee of the changes. However, if changes are substantial, the Thesis Advisor may call for a new proposal. Such a new proposal must be evaluated by the Committee and, once approved, should replace the previous one.

### The Written Thesis

The thesis must follow the WCU Graduate School, Master's Thesis Guidelines, for formatting, which is available at [http://www.wcupa.edu/admissions/sch\\_dgr/documents/thesisguide.pdf](http://www.wcupa.edu/admissions/sch_dgr/documents/thesisguide.pdf). Citation style should follow any peer-reviewed journal in the student's discipline or the APA guidelines. The first draft should be evaluated by the Thesis Advisor, and improved to the point

where it can be submitted to the Thesis Committee in preparation for the thesis defense. Once the thesis has been successfully defended, the student must submit a copy to the Dean of the Graduate School for formal approval.

#### Thesis Seminar and Defense

A seminar of around 50 minutes duration is required of all students nearing completion of their thesis. It should summarize major findings of their research, and is open to the public. The date, time, and room in which it is presented must be advertised to the Department of Biology faculty and any other interested persons at least a week before of the event. Normally it directly precedes the defense and is scheduled during the semester of intended graduation.

At the conclusion of the thesis seminar, each student must also pass an oral thesis defense. The defense is usually moderated by the Thesis Advisor, and provides an opportunity for all members of the Thesis Committee to examine the student on the research itself, or on areas of biology supportive of the thesis topic. The student is responsible for notifying all Committee members of the time and location of the defense. A thesis copy, already reviewed by the Advisor, should be given to each Committee member at least one week in advance of the defense. Committee members are then expected to bring written comments on the manuscript to the defense, and may use the manuscript as a basis for questions related to it.

At the conclusion of the defense, the student will be asked to leave the room so that Committee members can discuss their views of the written thesis and oral defense. As with approving the thesis proposal, the Committee will decide upon one of three courses of action:

1. If only minor changes are suggested to improve the thesis, the Committee may decide to leave the responsibility for making the changes with the Advisor. When satisfied, the Advisor signs the thesis, and forwards it to the Committee members for their signatures.
2. If any Committee member requests major changes, then the changes must be addressed in consultation with the Advisor and Committee. Signatures are then secured as before.
3. If a majority of the Committee feels that either the thesis is inadequate, or that the student showed a consistent lack of understanding of questions asked in the defense, recommendations for more research, courses, or readings may be made by the Committee.

Once these recommendations have been met, the student must schedule a second defense. Failure of two such defenses normally results in the student being dropped from program. In order for the thesis to be approved, all Committee members must agree that it is acceptable.

Infrequently, substantial disagreement within the Committee may lead to the refusal of one or more members to sign the thesis. In such cases, the Advisor must request formal review of the thesis defense by the Committee, which will then arbitrate all points of disagreement. Such instances are rare, and can be avoided if the student keeps all Committee members adequately informed of progress with their research.

Once the thesis is approved, the Advisor should obtain signatures of all Committee members on as many copies of the signature page as are intended for binding. One final copy, together with all signature pages, is then given to the Graduate Coordinator who submits it to the Dean of the Graduate School for their review. Once approved by the Dean, the student photocopies the thesis and all copies are delivered to the library for binding (at the student's expense; turnaround time is about 1-2 months). Four copies must be made for the University. Two will reside in the Library, one with the Graduate School, and one with the Department of Biology.

### Online Assessment

Students must complete an assessment of their program experiences before completing BIO 610. It can be found online at <https://wcupa.edu/sciences-mathematics/biology/bookAssessment.aspx>. Contact the Graduate Coordinator for the password.

### Exception to Graduate Policy/Regulations

At any time during their graduate career, students may request an exception to any policy discussed above. To do so, a Petition for Exception to Graduate Policy/Regulations for Graduate Students form must be filled out and then signed by the Graduate Coordinator, Chair of the Department of Biology, and the Dean of the Graduate School. The Dean makes final decisions.

### Grievances

Grievances should be handled at the lowest possible level. The student should first discuss the grievance with their Thesis Advisor, then if necessary with the Thesis Committee. If the grievance has not been resolved, the student should see the Graduate Coordinator and the Chair of the Department of Biology. At that time, if the grievance is unable to be resolved, the Dean of the Graduate School, whose decision shall be accepted as final by the student, will hear it.

### Graduation and Other Events of the Final Semester

It is the student's responsibility to inform the Graduate School of their intent to graduate. Deadline dates for this generally fall within the first month of the semester in which the student plans to complete their degree. The Graduate Coordinator should also be given an approximate timetable for completion of the degree at the beginning of the final semester.

## MS IN BIOLOGY – Advising Sheets

Requirement	Course	Credits	Term	Year	Grade
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### I. Core (12 credits)

Graduate Seminar in Biology	BIO 510	3	_____	_____	_____
Experimental Design and Analysis	BIO 511	3	_____	_____	_____
Topics and Research Methods in Cellular, Microbial, and Molecular Biology	BIO 520	3	_____	_____	_____
Topics and Research Methods in Ecology, Evolution, and Organismal Biology	BIO 521	3	_____	_____	_____

### II. Electives (15 credits)

Select 15 credits from: Any other graduate biology course except BIO 593, 609, and 610. Up to six credits of 400-level biology courses, where no 500-level course is available. Up to six credits of graduate course work from another department or university, pending advisor approval.

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

### Electives – Thesis Option (9 credits)

Select nine credits from: Any other graduate biology course, except BIO 591 and 593. Up to six credits of 400-level biology courses, where no 500-level course is available. Up to six credits of graduate course work from another department or university, pending advisor approval. Electives may not be repeats of courses unless the technique/topic changed significantly.

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*Common elective courses include:*

BIO 513	Research Techniques I	BIO 565	Immunology
BIO 514	Research Techniques II	BIO 566	Plant Physiology and Biochemistry
BIO 515	Research Techniques III	BIO 570	Population Biology
BIO 531	Molecular Genetics	BIO 571	Wetlands
BIO 535	Course Topics in Biology I	BIO 575	Plant Communities
BIO 536	Course Topics in Biology II	BIO 576	Freshwater Ecology
BIO 537	Course Topics in Biology III	BIO 580	Light Microscopy
BIO 564	Microbial Physiology	BIO 585	Epidemiology

### III. Research (3 credits)

Directed Research in Biology <sup>@</sup>	BIO 591	3	_____	_____	_____
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### Research – Thesis Option (9 credits)

Thesis Proposal <sup>#</sup>	BIO 608	3	_____	_____	_____
Thesis Research <sup>^</sup>	BIO 609	3	_____	_____	_____
Thesis and Defense <sup>*</sup>	BIO 610	3	_____	_____	_____

## Notes and Requirements

@ The student must present the results of the project in an open seminar to complete BIO 591. In addition, the student must pass a written examination prepared by the student's Advisory Committee. Students who fail this examination will not receive a grade for the course.

# A Thesis Committee must be formed and meet with the student to discuss course work and research ideas, and the Committee Composition section of the MS Student Progress Checklist – Thesis Option must be completed and submitted to the Graduate Coordinator at least a week before the semester starts, or the student cannot enroll in BIO 608.

^ A letter grade must be given for BIO 608 before the student can enroll in BIO 609. Paperwork must be filed at least a week prior to the start of the semester BIO 609 is to be conducted.

\* A letter grade must be given for BIO 609 before the student can enroll in BIO 610. Paperwork must be filed at least a week prior to the start of the semester BIO 610 is to be conducted. To complete BIO 610, the student must present their research in an open seminar and pass a thesis defense before their Thesis Committee. The degree will not be awarded until the Committee has accepted the thesis and it is signed by the Dean of the Graduate School.

Part-time students will be required to take the same group of courses as full-time students except they must complete BIO 608 by the end of year three. As with full-time students, part-time students cannot take BIO 609 unless they have received a grade for BIO 608. In addition, they must take BIO 610 by the start of year six and complete it by the end of that year.

### **Suggested Sequence for the MS**

____ ____ ____ ____	<b>Semester #1 (9credits)</b> BIO 510 (3) BIO 520 (3) Elective 1 (3)	____ ____ ____ ____	<b>Semester #2 (9 credits)</b> BIO 511 (3) BIO 521 (3) Elective 2 (3)
____ ____ ____ ____	<b>Semester #3 (9 credits)</b> Elective 3 (3) Elective 4 (3) Elective 5 (3)	____ ____ ____ ____	<b>Semester #4 (3 credits)</b> BIO 591 (3)

### **Thesis Option**

____ ____ ____ ____	<b>Semester #1 (9credits)</b> BIO 510 (3) BIO 520 (3) Elective 1 (3)	____ ____ ____ ____	<b>Semester #2 (9 credits)</b> BIO 511 (3) BIO 521 (3) BIO 608 (3)
____ ____ ____ ____	<b>Semester #3 (9 credits)</b> BIO 609 (3) Elective 2 (3) Elective 3 (3)	____ ____ ____ ____	<b>Semester #4 (3 credits)</b> BIO 610 (3)



## MS Student Progress Checklist

Advisors use this checklist to guide student program progress. At completion, the Advisor should keep a copy and give the original to the Graduate Coordinator. The Coordinator's signature in the Completion of BIO 591 section confirms that a student has completed the MS.

Student \_\_\_\_\_

Matriculation attained (date) \_\_\_\_\_ Degree candidacy attained (date) \_\_\_\_\_

### Committee Composition

The advisor and at least two other committee members must be from the department.

Advisor \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Attach any deficiencies/prerequisites to full matriculation.

### Outcome of Written Examination

This is a summary of results. Answers may be rated *pass*, *no pass* (requires further testing to ensure adequate knowledge for degree attainment), or *fail* (reserved for rare instances where the answer quality and/or quantity is so low that it effectively removes the student from the program with no provision for further testing).

Completion date \_\_\_\_\_

*Signatures indicate completion*

Advisor \_\_\_\_\_ Rating \_\_\_\_\_

Member \_\_\_\_\_ Rating \_\_\_\_\_

Member \_\_\_\_\_ Rating \_\_\_\_\_

Member \_\_\_\_\_ Rating \_\_\_\_\_

## Completion of BIO 591

To obtain a grade, the student must complete each of the following:

Completed the project \_\_\_\_\_

Received passing grades on each written exam question \_\_\_\_\_

Presented a seminar to the department \_\_\_\_\_

Completed the online exit survey \_\_\_\_\_

*Signatures indicate completion*

Advisor \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Graduate Coordinator \_\_\_\_\_ Date \_\_\_\_\_

## MS Student Progress Checklist – Thesis Option

Advisors use this checklist to guide student program progress. At completion, the Advisor should keep a copy and give the original to the Graduate Coordinator. The Coordinator's signature in the Completion of Thesis Research section confirms that a student has completed the MS.

Student \_\_\_\_\_

Matriculation attained (date) \_\_\_\_\_ Degree candidacy attained (date) \_\_\_\_\_

### Committee Composition

The Advisor and at least two other Committee members must be from the department.

Advisor \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Attach any deficiencies/prerequisites to full matriculation.

### Approval of Thesis Proposal (BIO 608)

*Signatures indicate that the committee has approved the proposal*

Advisor \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

### **Completion of Thesis Research (BIO 609)**

The student successfully completed the research necessary to write the thesis.

*Signatures indicate completion and that a grade will be given*

Advisor \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

Member \_\_\_\_\_ Date \_\_\_\_\_

### **Thesis Defense Outcome (BIO 610)**

Student \_\_\_\_\_ Defense date \_\_\_\_\_

The student has successfully defended a thesis to the Committee *entitled*:

Committee members in attendance:

The defense normally results in one of the following outcomes:

1. If only minor changes are suggested to improve the thesis, the Committee may decide to leave the responsibility for making the changes with the Advisor. When satisfied, the Advisor signs the thesis, and forwards it to the Committee members for their signatures.
2. If any Committee member requests major changes, then the changes must be addressed in consultation with the Advisor and Committee. Signatures are then secured as before.
3. If a majority of the Committee feels that either the thesis is inadequate, or that the student showed a consistent lack of understanding of questions asked in the defense, recommendations for more research, courses, or readings may be made by the Committee.

Attach any outcomes of the defense, including specific requirements which must be met by the student, and indicating a probable date of completion of the thesis.

*Signature signifies completion*

Advisor \_\_\_\_\_ Date \_\_\_\_\_

## ---- Frequently Asked Questions ----

### ***1. How do I register for BIO 591?***

You cannot register for this research course on your own. Instead, your Graduate Advisor makes a request to the Graduate Coordinator, who then has you registered. The Advisor will be listed as the Professor of Record. You need to do this the semester prior to the one you plan to take it.

### ***2. How do I register for BIO 608, 609, or 610?***

You cannot register for these thesis research experiences on your own. Instead, your Thesis Advisor makes a request to the Graduate Coordinator, who then has you registered. The Advisor will be listed as the Professor of Record. You need to do this the semesters prior to those in which you plan to conduct them. Note, as per the MS -Thesis Option guidelines (above), that all requirements for these courses must be met in order for you to be registered.

### ***3. How do I transfer a course taken from another college or university?***

Once you have completed such a course, fill out a Transfer of Graduate Credit form (contact the Graduate School to find) and have transcripts from institution at which you took the course(s) sent to the Graduate School for approval. Contact the Graduate School or Registrar if you have questions about the form.

### ***4. Can I take undergraduate courses for credit?***

Yes! As per the Advising Sheets, you can take up to two, three credit, courses as long as they are at the 400-level. Your Graduate or Thesis Committee must approve them.

### ***5. Who is my Advisor if I am new and just starting to take classes?***

The Graduate Coordinator, until you choose a Graduate or Thesis Advisor. The current Coordinator is Dr. Greg Turner.

### ***6. How do I choose a Graduate or Thesis Advisor if I do not have one?***

This may seem daunting, so the Graduate Coordinator can help. If you are a newly incoming MS or MS – Thesis Option student, or a student who has been with us for some time but are still without an Advisor, the Graduate Coordinator can help you choose one. The Coordinator can also provide tips on good ways to approach and talk with a potential advisor. One thing you can do to start the process is to review the faculty webpages found on the Biology homepage for information on their research, publications, and graduate student (current and past) projects.

### ***7. When should I choose an advisor?***

If you are a full time student, the sooner the better, but no later than the end of the third semester if you are a regular MS student or the first semester if you are a MS – Thesis Option student. If part-time, you can wait a little longer. For advice, see Handbook sections on Graduate and Thesis Advisors (above). If still not sure, speak with the Graduate Coordinator.

### ***8. Can I take a semester off?***

Yes! But, you can only take off two consecutive semesters or the Graduate School will drop you. To avoid this situation, fill out a Leave of Absence form available from the Graduate School.

### ***9. When I am almost finished with my career here, do I have to apply for graduation?***

Yes! You can do this through the Apply for Graduation link on myWCU. You should probably do this no later than the start of the semester in which you plan to graduate.

***10. Can I walk in May even if I still need to complete courses or research in the summer?***

Yes, you certainly can!

***11. Where do I get my cap and gown?***

The location changes from time to time, but usually you can rent and get caps and gowns from the Graduate School in McKelvie Hall or at Sykes. Inquire with the Graduate School if not sure.

***12. If I have other questions not answered here, whom can I ask?***

The Graduate Coordinator is always available (via email mainly) to help. Ask away! Or, you can ask your Advisor or Committee members.

***13. What is the minimum grade needed to pass a graduate course?***

A C- is the minimum passing grade. Anything below this is considered a failing grade as there is no D grade for graduate students. Note that you really do not want to get a grade below a B- in any course as there are high expectations for graduate students in terms of grade success.

GDT 6/2020