Handbook of M.S. Degree Programs in Genetics and Biochemistry
and Molecular Biology

Department of Genetics and Biochemistry
College of Science
Clemson University

Revised: 07/2021
This booklet has been prepared by the Genetics & Biochemistry faculty to inform M.S. graduate students of Departmental and Graduate School policies and regulations. The Graduate School Policies (available on the web at https://www.clemson.edu/graduate/students/policies-procedures/index.html) are the underlying regulations, so students should also become fully acquainted with the information contained on that webpage. Not being familiar with regulations may cost a student, their advisor, and the department time and money. Advice about other aspects of graduate study is included in the last section of this manual. Students who start enrollment in a summer shall follow the timelines outlined for fall enrollment.

In Section XI, there is a checklist of important events and deadlines in the progression toward your degree. We suggest that students examine this list and carefully plan their activities as soon as possible. Some changes may be in order as time goes by, but this outline will serve as a good reminder and can be used by the Advisory Committee in a yearly evaluation of each student's progress. Careful planning assists with coordinating funding sources and teaching assistantship activities; thus, you are strongly advised to continue planning and requesting input throughout your program.

We expect that this guidebook will be updated regularly. Policies that affect a given student are the ones in place at the time the student began the degree program. As a rule, policy changes apply only to incoming students, but students already in the program can opt to follow the new policies if they wish.

Department Chair
Dr. David F. Clayton, dfclayt@clemson.edu, 153 Poole

Graduate Program Administrator
Kimi Brown, kfuhrma@clemson.edu, 151 Poole

Contact Information
Department of Genetics and Biochemistry
Clemson University
154 Robert F. Poole Agricultural Center
Clemson, SC 29634-0318
Phone: 864-656-6237 Fax: 864-656-6879
Web: https://www.clemson.edu/science/departments/genetics-biochemistry/index.html
### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td>2</td>
</tr>
<tr>
<td>I. Selection of the Major Advisor</td>
<td>4</td>
</tr>
<tr>
<td>II. The Advisory Committee</td>
<td>4</td>
</tr>
<tr>
<td>III. The Graduate Committee</td>
<td>5</td>
</tr>
<tr>
<td>IV. Graduate Curriculum</td>
<td>5</td>
</tr>
<tr>
<td>V. Scholarly Work</td>
<td>8</td>
</tr>
<tr>
<td>VI. Annual Leave</td>
<td>8</td>
</tr>
<tr>
<td>VII. Specific Requirements</td>
<td>8</td>
</tr>
<tr>
<td>VIII. Seminar Participation</td>
<td>9</td>
</tr>
<tr>
<td>IX. Thesis Preparation</td>
<td>10</td>
</tr>
<tr>
<td>X. Assistantship Support</td>
<td>11</td>
</tr>
<tr>
<td>XI. Checklist of Important Events</td>
<td>11</td>
</tr>
<tr>
<td>XII. Additional Information</td>
<td>12</td>
</tr>
<tr>
<td>A. Academic Integrity</td>
<td>12</td>
</tr>
<tr>
<td>B. University Ombudsman</td>
<td>13</td>
</tr>
<tr>
<td>C. Resources for Graduate Students with Special Needs</td>
<td>14</td>
</tr>
<tr>
<td>D. Other Sources of Support/Advice</td>
<td>14</td>
</tr>
<tr>
<td>E. Annual Survey Form</td>
<td>14</td>
</tr>
</tbody>
</table>
SECTION I. SELECTION OF THESIS PATH AND MAJOR ADVISOR

There are two paths for completion of the M.S. (thesis) degree, with students identifying their preference during the application process. THE STUDENT MUST INDICATE WHICH PATH THEY INTEND TO COMPLETE ON THEIR APPLICATION TO THE PROGRAM. The nature of the research that is completed distinguishes the two paths. In the Empirical (experimental, laboratory based) Path, students identify a research lab and complete a bench-based research project and resulting thesis. In the Literature Path, students will identify a research mentor and complete a literature-based research project and thesis.

A student seeking the M.S. (thesis) degree must identify a Major Advisor (supervisor) by mutual agreement before being accepted into the program. That faculty member, as the Major Advisor, will advise the new graduate student in making initial decisions concerning coursework and plan of study (GS2) as outlined by the Graduate School requirements. The Major Advisor and student will discuss mutual research interests and possible research projects. Change of Major Advisor or thesis path after enrollment is permitted only if there are mutual agreements between students and Major Advisors.

SECTION II. THE ADVISORY COMMITTEE

A. Composition

During the second semester of enrollment, the Major Advisor and graduate student must establish an Advisory Committee of faculty members who oversee the progress of the student toward the M.S. degree. The Chair of the Advisory Committee, who serves as the Major Advisor, must either be a tenured or tenure-track faculty member or a full-time lecturer (all rank) of the Department of Genetics and Biochemistry. The Major Advisor will supervise the research and, together with the Advisory Committee, ensure that the quality of the research meets the standards of the Department.

The Advisory Committee will have a minimum of three members (including the Major Advisor) for M.S. students. The majority of the members must be full-time (more than 51% appointment) tenured or tenure-track faculty or full-time lecturers in the Department of Genetics and Biochemistry. An additional member of the committee may be a faculty person from outside the university whose research is in an area compatible with the proposed research. This member will participate at minimum as a reader of the thesis, with greater participation at the option of the student, the committee and the outside member. Students and Major Advisors should be aware that while addition of an outside faculty member is strongly encouraged, there are complications such as adjunct appointment status (which requires submission of transcripts and university approval) and availability for committee meetings that must be addressed.

When the Advisory Committee is formed, the student needs to file GS-2 Committee Selection
It is possible in extenuating circumstances to change the composition of a student's Advisory Committee before completion of the degree. In such circumstances, a new GS-2 form must be electronically filed with the Graduate School and approved by the members of the new Advisory Committee, the Graduate Coordinator and the Department Chair.

B. Responsibilities

The Advisory Committee, convened by the Chair, reviews the student's plan of study, decides on appropriate coursework, assists in the preparation of and approves the thesis, and makes the final recommendation to award the degree. This committee is designed to help the student complete a strong thesis and ensure the quality of the training of the student; thus, the composition of the committee should facilitate this process.

C. Advisory Committee Meetings - Presentation of Research

The student will meet with the Advisory Committee at least once per academic year and it is the student’s responsibility to schedule these meetings. The student is expected to give a short presentation at the first meeting with the Advisory Committee that outlines the research project and progress to date. Similar presentations are expected at each subsequent meeting of the Advisory Committee. The intent is to verify that the student is making reasonable progress in accomplishing the research objectives and make recommendations.

SECTION III. THE GRADUATE COMMITTEE

The Graduate Committee is charged in the Departmental Bylaws to “coordinate the recruiting, selection, and admission of graduate students and make recommendations for financial support, as well as review student performance.” To discharge this responsibility, the Graduate Committee surveys each graduate student in the Department annually to review the student’s progress and performance. Each student must complete and submit an Annual Survey Form (described in Section XII. Additional Information, Part E) to the Graduate Committee before July 1 of each year.

SECTION IV. GRADUATE CURRICULUM

A. Graduate Degree Plan of Study (GS-2 Form)

Upon selection of a Major Advisor, the student should confer with the Major Advisor and prepare a Plan of Study and select members of the Advisory Committee. The Advisory Committee should meet by the middle of the second semester for M.S. students and approve the "Clemson University Plan of Study" (GS-2 Form). The GS-2 Form must be filed electronically through iROAR.

B. Coursework
The M.S degree requires 24 credit hours of coursework and at least 50% of the coursework must be at the 8000 level. Additional credit hours required for full time status are fulfilled by GEN/BCHM 8910. All students must register for Seminar I GEN/BIOCH 8250 (1,0) each semester enrolled, or GEN 8510 Seminar II (1,0) in the last semester.

### Curriculum for M.S. in Genetics or Biochemistry & Molecular Biology

<table>
<thead>
<tr>
<th>First Year (FALL)*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN/BCHM 8050 Issues in Research (3hr)</td>
<td></td>
</tr>
<tr>
<td>BCHM 8140 Advanced Biochemistry (4hr)</td>
<td></td>
</tr>
<tr>
<td>GEN/BCHM 8250 Seminar I (1hr)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Year (SPRING)*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN 8140 Advanced Genetics (4hr)</td>
<td></td>
</tr>
<tr>
<td>Science Elective (3hr)</td>
<td></td>
</tr>
<tr>
<td>Science Elective (1-3hr)</td>
<td></td>
</tr>
<tr>
<td>GEN/BCHM 8250 Seminar I (1hr)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year (FALL)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective course (3hr)</td>
<td></td>
</tr>
<tr>
<td>GEN/BCHM 8250 Seminar I (1hr)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year (SPRING)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective course (3hr)</td>
<td></td>
</tr>
<tr>
<td>GEN/BCHM 8510 Seminar II (1hr) if graduating</td>
<td></td>
</tr>
</tbody>
</table>

| Total Hours: 30-33 hours (24 as coursework) |  |

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NB: Additional hours required for full time status are fulfilled by GEN/BCHM 8910 for M.S. students.</td>
</tr>
</tbody>
</table>

* Please be advised that the required courses are taught only in the semester indicated.

### Science Elective Courses for Genetics and Biochemistry & Molecular Biology Programs:

The coursework described within the curriculum comprises a body of information essential for both breadth and competence in a student's field of interest. Core courses in biochemistry and genetics (see above) as well as more specialized courses (see below) are essential for pursuing professional competence at the M.S. level in the chosen area. Additional courses may be added to the required courses as the student or the Advisory committee deems appropriate. The following list provides suggestions for elective courses but is not exhaustive. Many of these courses are not offered every year. Check the online course registration for information on offerings in a given term.
BIOL (GEN) 6050: Molecular Genetics of Eukaryotes  
GEN 6100: Population & Quantitative Genetics  
GEN 6200: Molecular Genetics and Gene Regulation  
GEN/BCHM 6400: Bioinformatics  
GEN 6500: Comparative Genetics  
GEN 6700: Human Genetics  
GEN 8200: Genomics and Proteomics  
GEN 8900: Special Topics in Genetics  
BCHM 6310: Physical Approach to Biochemistry  
BCHM 6320: Biochemistry of Metabolism  
BCHM 6360: Molecular Biology: Genes to Proteins  
BCHM 6430: Molecular Basis of Disease  
BCHM 8100: Principles of Molecular Biology  
BCHM 8900: Special Topics in Biochemistry  
Other available 6000 or 8000 level GEN or BCHM courses  

Other 6000- and 8000-level courses in BIOL, CH, MICR, HORT, PHYS, etc. may also be taken in consultation with the Advisory Committee. Examples are:  
STAT 6020: Introduction to Statistical Computing  
BIOL 8000: Concepts in Evolution, Ecology and Organismal Biology  
BIOL 8010: Concepts in Molecular, Cellular and Developmental Biology  
BIOL 8140: Scientific Writing in Biology  
BIOL 8710: Experimental Design and Analysis for Biologists using R  
MICRO 8000 Concepts in Microbiology I  
MICRO 8010 Concepts in Microbiology II  

A course substitution must be noted on the GS-2 form. Any other courses taken outside of those listed/outside of our department, are covered under your tuition waiver (with rare exception).  

C. Grade Requirements  
Grades of an A or B are expected in all courses. A minimum of a B average (3.0 GPA) in all graded coursework listed on the GS-2 form is required for continuation in graduate school. A student with a GPA less than 3.0 is placed on probation. A student on probation will be permitted a period of nine graded credit hours (Fall or Spring) to raise a deficient grade average to 3.0. Summer Semester and P/F course credit hours are not included. However, a grade lower than C in any of the courses found on the
plan of study (GS-2) will immediately disqualify a student from further graduate study in Genetics or Biochemistry & Molecular Biology.

D. Transition from M.S. to Ph.D. program

For M.S. students who have completed Advanced Biochemistry (BCHM 8140), Advanced Genetics (GEN 8140), and Issues in Research (GEN/BCHM 8050), and wish to transit to the Ph.D. program, a request detailing reasons for transition, along with a recommendation letter from the current mentor or a Clemson faculty who can comment on the progress and success of the student during the Master's program, must be submitted to the Graduate Study Coordinator. The students are expected to have a ≥ 3.0 (B) grade for all the courses they have taken since entering the M.S. program. Please be advised that all policies pertaining to the Ph.D. programs and assistantships apply. When the transition is granted, a GS14 form needs to be completed, followed by a new Plan of Study GS2 Plan of Study.

SECTION V. SCHOLARLY WORK

The M.S. (thesis) degrees in Genetics and Biochemistry & Molecular Biology are research degrees. While coursework is required to broaden the student's training and to increase his or her professionalism, the primary goal of this coursework is to increase one's ability to do competent research (whether empirical or literature based). It is the quality of the student's research that will eventually lead to the award or denial of the desired degree. Following completion of required coursework, duties associated with research will occupy most of a student’s time and thought. Unlike courses, research is not structured with well-defined hours. This requires that the students have the proper maturity, mental discipline, and work habits to be independent and productive. Research is not done on a forty hour a week basis from 9:00 A.M. to 5:00 P.M., Monday through Friday.

Graduate students should plan to make maximal use of the summer period. Unlike undergraduate students, graduate students should not view class breaks specified in the university calendar as vacation time. Rather, these breaks from scheduled classes should be seen as invaluable time for performing research.

SECTION VI. ANNUAL LEAVE

Students must discuss with their Major Advisor about leave in advance to make appropriate arrangements.

SECTION VII. SPECIFIC REQUIREMENTS

A. Thesis and Oral Defense
Before being awarded a M.S. degree in Genetics or Biochemistry & Molecular Biology, the student must prepare a thesis describing his or her original research, be it bench-based or literature-based. The research must be of high quality and importance such that the material is considered publishable, although publication is not a requirement for the degree. A copy of the thesis must be submitted to each member of the student's Advisory Committee and a copy left on file in the departmental office at least two weeks prior to the final oral examination/defense. The student will present his or her thesis research in a seminar (in conjunction with GEN/BCHM 8510 Seminar II described below) open to the public and defend that research privately before the Advisory Committee and all faculty who wish to attend in an oral examination. The oral examination will not necessarily be limited to the student's thesis and may include other topics the Advisory Committee deems relevant. All deadlines (see Section XI. Checklist of Important Events) are as listed in the Graduate School Announcements.

B. In addition to notifying the Graduate School and the members of his or her Advisory Committee at least two weeks before the presentation, the date, place and time of the public presentation and oral examination will be posted in the departmental office at least a week before the examination. One or more copies of the thesis must be available in the departmental office at least two weeks prior to the oral examination. If the student fails to pass the oral exam, he or she will be permitted **one** re-examination at a time agreed upon by the Advisory Committee (no more than six months later).

B. Time Requirements.

Students desiring the M.S. degree should, in collaboration with their advisory committee, set the goal of completing the requirements in a period of two to three years. The Graduate School requires that all work toward the degree be completed in not more than six calendar years.

SECTION VIII. SEMINAR PARTICIPATION

A. Departmental Seminars (GEN 8250 or BCHM 8250)

When the student enters graduate school, he or she is entering the scientific profession. Part of professional training involves continual expansion of the student's areas of knowledge and keeping abreast of current advances in their respective fields. The department provides a schedule of scientific speakers from within and outside Clemson University to aid this process.

Whenever possible, the department provides the student with the opportunity to meet informally with the visiting speakers. Students are strongly urged to use this opportunity to best advantage. Contacts made during this time can be of great importance in the student's professional life.

All graduate students in Genetics and Biochemistry & Molecular Biology must enroll in the
seminar course (GEN 8250 or BCHM 8250) each Fall and Spring semester in which they are a full-time student in the degree program. Attendance by all graduate students in Genetics and Biochemistry & Molecular Biology at Departmental Seminars and at the Graduate Research Symposium (described below) is mandatory. Absence from more than 20% of departmental seminars or Graduate Symposium of Research presentations (described below) will result in an F in GEN/BCHM 8250 and immediate dismissal from the Genetics and Biochemistry & Molecular Biology graduate programs. Any exception must be approved in advance by the Major Advisor and the Department Chair.

The Graduate Research Symposium, which is separate from the departmental seminar series, was created to give students more opportunities to present their own research and gain experience in giving poster presentations and formal seminars. These symposia showcase the excellent work of students while facilitating interactions and potential collaborations. All M.S. students are required to attend in each semester of enrollment and are expected to give a poster presentation in their third semester of enrollment.

Genetics and Biochemistry & Molecular Biology graduate students being trained by Genetics and Biochemistry faculty at off-campus locations shall not be required by virtue of their location to fulfill additional obligations beyond those specified in the handbook. This does not preclude voluntary participation, but mandatory requirements are the same for all students in the department regardless of physical location.

B. Thesis Seminars (GEN/BCHM 8510)

All students are required to give a final presentation of their thesis work as a regular 45-minute M.S. defense seminar. The Advisory Committee and student will decide when to hold the actual thesis defense, but the defense and public presentation do not need to be on the same day. Adequate notice of defense (minimum of 14 calendar days) must be given to the Departmental Administrator so that proper notice can be given to the Graduate School and department faculty. Students shall sign up for GEN/BCHM 8510 in the semester they are graduating.

SECTION IX. THESIS PREPARATION

Students should review the formatting rules for thesis from the Graduate School before writing the first draft of the thesis. A checklist and detailed FAQs addressing common issues in formatting are available online at https://www.clemson.edu/graduate/students/theses-and-dissertations/index.html. The rules and formats prescribed by the University are rigidly enforced by the Graduate School and final submission requires electronic conversion to a pdf file. Also, journals such as the Journal of Biological Chemistry, Biochemistry, Genetics, Cell, and others, recommend that writing manuals such as Strunk's
Elements of Style or the American Chemical Society's Guidebook for Authors be consulted for proper form. The English Department’s Writing Support Center offers assistance in writing to students for whom English is not their native language, as well as to any Clemson student who requests it.

The following rules govern the citation of references in a thesis or thesis:

1. References will be cited as done in a leading journal of biochemistry, molecular biology or genetics and agreed upon by the Advisory Committee and must include the full title of an article.

2. If journals are to be abbreviated, they must conform to standard abbreviations.

When a student has prepared a draft, the student should consult with his or her Major Advisor. The draft should be re-written with appropriate changes and the procedure repeated as many times as necessary. The thesis must be in essentially final form for the oral examination: graphs should be in finished form with complete captions and the text of the final draft typed with special care. It should be understood that if there are no additions or corrections, as a consequence of the oral examination/defense, this copy of the thesis could be considered the final draft. A prudent candidate will have consulted the Advisory Committee members and the Graduate School with respect to the text and format of his or her thesis before the oral defense to anticipate any major alterations. As noted previously, a copy of the thesis must be submitted to each member of the student's Advisory Committee at least two weeks before the final oral examination/defense and a copy left on file in the departmental office. Additions, deletions or alterations may be suggested or required at the oral examination/defense.

The Genetics and Biochemistry faculty strongly disapproves of students leaving residency in the Clemson area before the successful completion of the thesis. Completion by mail is a time consuming, difficult process and generally results in a less than optimum quality thesis.

SECTION X. ASSISTANTSHIP SUPPORT

Currently there are no assistantships for students in the Master programs. Enrolled students will cover tuition, fees, living and other expenses from their personal resources.

SECTION XI. CHECKLIST OF IMPORTANT EVENTS

<table>
<thead>
<tr>
<th>Task</th>
<th>Timing of task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of Major Advisor</td>
<td>Before admission.</td>
</tr>
<tr>
<td>Selection of Advisory Committee</td>
<td>Not later than the end of the first semester of enrollment.</td>
</tr>
</tbody>
</table>
Submit Graduate Degree Curriculum Form GS-2  End of second semester for M.S.

Presentation of thesis research  Poster presentation in the Graduate Research Symposium in the third semester

Application for Graduation and Diploma Order (Form GS4)  The beginning of the final semester before graduation*.

Order cap, gown and hood  About three months before graduation*.

Completion of thesis  Best well in advance, but no less than two weeks before oral defense. The Advisory Committee must approve the thesis before it is submitted to the graduate school.

Announcement of exam & placement of thesis in office  Two weeks before oral defense date.

Oral defense (GS7)  At least a month before graduation.*

Obtain approval of thesis format from Graduate School  At least two weeks before graduation.*

Submit copies of thesis to Graduate School  At least one week before graduation.*

!!!!!!Graduation!!!!!!

*Formal deadlines for each of these events are posted by the Graduate School keyed to graduation dates in December, May, and August (https://www.clemson.edu/graduate/students/deadlines.html). These deadlines are immutable, so it is wise to check early.

SECTION XII. ADDITIONAL INFORMATION

A. Academic Integrity
Clemson University has an official policy on academic integrity. “As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.” Because there are serious consequences for any instance of plagiarism or misconduct, including suspension from the degree program, students are advised to become familiar with the Clemson Graduate Academic Integrity Policy (https://www.clemson.edu/graduate/files/pdfs/PolicyHandbook_2019-20.pdf).

Research, the creation of new knowledge, and the membership of a young scientist into the ranks of other scientists engaged in research activities, involves special aspects of truthfulness, honor, responsibility, trust and respect. We direct students to the National Academy of Sciences online book (the pdf is a free download) On Being a Scientist: Responsible Conduct in Research (http://www.nap.edu/catalog.php?record_id=12192) for guidelines and discussions of these matters. Students should consult with their Advisory Committee chair or the chair of the department if they encounter any practices that seem questionable or have any doubts about what appropriate practices are in collecting and reporting data. During graduate training, students will be given opportunities to discuss these matters in some detail with experts in ethics and appropriate practices in research.

B. University Ombudsman

The ombudsman is an independent, confidential resource that provides assistance to faculty and graduate students in resolving problems, complaints and conflicts when normal processes and procedures have not worked satisfactorily. The Ombudsman's Office serves as a central information source on policies, procedures and regulations affecting faculty and graduate students. The office refers individuals to persons able to resolve problems or handle appeals at the lowest possible level. Where appropriate, the ombudsman can facilitate and/or mediate communication between parties who find themselves in a dispute. More information about the functions of the ombudsman can be found at http://www.clemson.edu/administration/ombudsman/index.html. Concerns can be directed to the university ombudsman for faculty and graduate students by letter, walk-in, appointment or telephone:

201 West Cherry Road
Seneca, SC 29678
Phone: 864-656-1750
Fax: 864-656-4373
C. Resources for Graduate Students with Special Needs

For graduate student research and coursework:

Student Accessibility Services (SAS)

http://www.clemson.edu/academics/studentaccess/student-resources.html

Suite 239 Academic Success Center Building
864-656-6848

Margaret Camp, Director
mmcamp@clemson.edu

What to do:
Meet with someone from Student Accessibility Services to disclose disability and discuss possible accommodations.
Provide documentation of disability (contact SAS for guidelines)

For graduate students who struggle with executive functioning:

Academic Success Center

http://www.clemson.edu/asc/
864-656-6452

What to do:
Set up meeting with Academic Coach, if necessary. An academic coach can help with difficulties with executive functioning: social skills, self-direction, self-awareness, etc.

D. Other Sources of Support/Advice

1. Graduate Student Resources Page (https://www.clemson.edu/graduate/students/resources.html)
3. How to Be a Good Graduate Student (http://www.cs.indiana.edu/how.2b/how.2b.html)

E. Annual Survey Form

All Graduate students are required to complete an annual survey form and submit needs to be updated by July 1 each year and emailed back to the graduate committee. The survey form will be sent via email to the students about a month before the deadline.