Division of Biological Sciences
University of Missouri

GRADUATE EDUCATION HANDBOOK

AY23-24

August 2023

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INTRODUCTION

This handbook is a guide for graduate students and graduate faculty mentors in the Division of Biological Sciences (DBS). It contains information on requirements specific to the Ph.D. degree and M.A. degree in biological sciences as required by the Division, the University, and the Graduate School.

Sources and additional information:

- Master's Requirements (University)
- Doctoral Requirements (University)
- Master's Degree (Graduate School)
- Doctoral Degree (Graduate School)
- MA in Biological Sciences (DBS)
- Ph.D. in Biological Sciences (DBS)
- Division of Biological Sciences Graduate Education Program (DBS)

Information contained in this manual should be considered supplementary to existing University policies and is subject to supersession at any time by any and all applicable rules, regulations, and policies outlined by the University System, MU Graduate School, and the Division of Biological Sciences, where and/or when applicable. If you believe this document contains any errors or inaccuracies, please notify the Division's Director of Graduate Studies (DGS) or DGS staff.

DIVERSITY STATEMENT

The Division of Biological Sciences recognizes that an inclusive and diverse environment is essential for scientific excellence and innovation in our research, teaching, and service missions. At its core, scientific innovation flourishes from the fusion of different perspectives and experiences, which are inherently linked to the composition of the academic community.

Therefore, we are committed to building a community in which all participants feel equally welcome and encouraged to contribute. Our commitment requires that all faculty, staff, and students of the Division actively promote an inclusive environment in which all members of the DBS community and visitors feel welcome. As individuals we will strive to recognize our biases and work together to actively minimize their influence on our interactions, opinions, and decisions. This commitment is reflected in our goal of increasing the participation of members of historically and currently excluded groups in our Division at all levels.

We are committed to building an inclusive, unbiased and prejudice-free environment that values, respects, and welcomes all individuals with their diverse backgrounds, experiences and perspectives* and will support all in their academic and professional development.

We are committed to providing a community in which all our members (i.e., faculty, staff, and students) are expected to respectfully interact with all faculty, staff, students, and the public; and recognize the importance of having different perspectives on campus and beyond, which is fostered by having a diverse population of students, faculty, and staff.

We are committed to further increasing the diversity of our faculty, staff, and students by recruiting and retaining members of historically and currently excluded groups, particularly those underrepresented in the Division and in the biological sciences nationwide.

We embrace evidence that an inclusive environment and a diverse community stimulates scientific innovation and educational excellence. We aspire to become a model for the appreciation, enhancement, and implementation of inclusion and diversity both at MU and within the broader academic community.

Depending on our roles in the Division, we have different avenues and responsibilities to foster inclusiveness:

As staff, we are committed to:

- developing practices and policies that foster inclusiveness and diverse experiences, promoting equal participation of all groups
- appreciating diverse experiences as opportunities for personal and professional growth
- welcoming opportunities for professional development, including those addressing inclusiveness and diversity in our workforce and society

As students, we are committed to:

- being respectful of others in the community, such as peers, faculty, and staff, regardless of their backgrounds

- appreciating the opportunity to interact with people of different backgrounds
- utilizing diverse experiences as opportunities for personal and intellectual growth
- being receptive to new ideas and opinions

As faculty, we are committed to:

- being role models for promoting inclusiveness and diversity
- being respectful in our interactions with all members of the division, university community, and public.
- developing teaching and mentoring practices that foster inclusiveness and diverse experiences, promoting equal participation of all groups
- continually revising our teaching methods to avoid approaches that can inadvertently hamper the success of students

DBS CODE OF CONDUCT

1. Purpose

In the Division of Biological Sciences (DBS), we aim to be a place where all students, staff, and faculty feel welcome and empowered to succeed (please see DBS Diversity Statement). In the interest of this goal, this code of conduct outlines our expectations for all members of the Division and outlines a procedure for addressing unacceptable behavior.

2. Scope

The University of Missouri has implemented guidelines and policies for conduct in several areas. We expect our members of DBS to be familiar with and adhere to those guidelines and policies. This document does not in any case supersede University-level policy. We do not outline specific consequences of unacceptable behaviors here because this document is not intended to outline disciplinary actions, but instead to outline strategies for resolving problems when they arise. Consequences for unacceptable behaviors that occur repeatedly will be specific to the situation and will be handled by a supervisor or University disciplinary body as appropriate.

3. Expected Behavior

The following behaviors are expected and requested of all members of DBS:

- Be welcoming, considerate, and respectful in both your speech and actions towards all members of DBS. Make an effort to consider how your speech and actions will affect others.
- Be an active participant in the Division. DBS works best when everyone is committed to contributing to our mission.
- Strive to communicate openly with others, always seeking collaboration over conflict.
- Be clear about your expectations of other members of DBS. For example, graduate students and mentors should be familiar with Mizzou's expectations and consider creating a lab document for more individual lab-specific expectations. See: https://gradstudies.missouri.edu/current-students/scholarly- integrity-ethics/guidelines-for-good-practice-in-graduate-education/
- Be honest and hold oneself to a high ethical standard.

4. Unacceptable Behavior

- DBS, like the University of Missouri as a whole, will not tolerate any form of discrimination, bias-motivated violence, sex-based violence, or retaliation under any circumstances. Also see: https://equity.missouri.edu/reporting-and-policies/. This behavior includes but is not limited to violence, threats, bullying, unwelcome sexual attention, and/or sexist, racist, homophobic, transphobic, ableist or otherwise discriminatory jokes and language.
- Yelling, name calling, and insults are not acceptable ways to communicate with other members of DBS.

5. Reporting Guidelines & Conflict Resolution Strategies

All DBS members are expected to adhere to this code of conduct. Anyone asked to stop

unacceptable behavior is expected to comply immediately. When a member of DBS is not behaving according to these expectations or is engaging in unacceptable behaviors, the following conflict resolution strategy should be pursued.

Step 1: The preferred first approach for all members of DBS is to resolve the issue by direct, open communication. Note that one of our expectations for DBS members is to strive to communicate openly with others, always seeking collaboration over conflict. We encourage DBS members to first attempt speaking directly to the parties involved to attempt a resolution, when possible. DBS members might also consider seeking informal mediation of the issue with the assistance of other DBS members as appropriate. For example, graduate students may reach out to the Director of Graduate Studies, members of the Graduate Education Committee, their other committee members, or the Director of DBS.

Step 2: If resolution is not possible via direct communication with the parties involved, we encourage DBS members to report the issue to either your representative on Divisional Council or the Director of DBS. In either case, the report will result in a more formal conflict resolution process being initiated as appropriate, depending on the positions of those involved (i.e., faculty, staff, and/or graduate students).

a) Conflicts involving faculty members or staff will be referred to the Employee Assistance Program (https://www.umsystem.edu/totalrewards/benefits/eap) for mediation

b) Conflicts involving graduate students and/or postdoctoral scholars will be referred to the Assistant Vice Provost for Graduate and Postdoctoral Affairs. Graduate students can also contact Assistant Vice Provost for Graduate and Postdoctoral Affairs directly if they prefer not to issue a report to their representative on Divisional Council or the Director of DBS.

c) Conflicts involving undergraduate students will be referred to the Director of Undergraduate Studies, Dr. Gerald Summers (SummersG@missouri.edu).

Step 3: If not all parties are satisfied with the resolution reached in steps 1 and 2, the complaint may be escalated to the University of Missouri grievance reporting mechanism: https://www.umsystem.edu/ums/rules/collected_rules/grievance

Privacy and confidentiality: Every attempt will be made to ensure privacy and confidentiality when handling reports. Members of DBS that receive reports are expected to keep all reports confidential. However, some violations, including those regarding discrimination, bias-motivated violence, sex-based violence, and retaliation, will be reported to The Office for Civil Rights & Title IX (http://civilrights.missouri.edu/reporting/). DBS will not be part of a culture of silence that might allow these kinds of violations to persist in our community. You should therefore know that further action may be taken at the University level. If you desire a resource that will allow you to talk about an incident but keep it completely confidential, see the following list of confidential resources: https://equity.missouri.edu/reporting-and-policies/confidentiality-and-privacy/

CONTACTS

Administrative

- **Dr. Manuel Leal**, Director of Graduate Studies, 209 Tucker Hall, LealM@missouri.edu
- **Dr. David Schulz**, Division Director, 105 Tucker Hall, SchulzD@missouri.edu
- **Dr. Gerald Summers**, Associate Director of Instruction, Summersg@missouri.edu

Graduate Education Committee (GEC) - AY2023/2024

- **Dr. Elizabeth King**, 401c Tucker Hall, kingeg@missouri.edu
- **Dr. Joe Santin**, 102 Lefevre Hall, santinj@missouri.edu
- **Dr. Kevin Middleton**, 209 Tucker Hall, middletonk@missouri.edu
- **Graduate Student Representative**, (to be decided in September)

Division of Biological Sciences Staff Support

- **Melody Kroll**, 218 Tucker Hall, krollmm@missouri.edu
  --Graduate studies support staff, graduate forms, graduate course permission numbers, Graduate Seminar, recruitment, annual evaluations
- **Rebecca Ballew**, 105 Tucker Hall, ballewr@missouri.edu
  --DBS Seminar, conference room reservations, building/lab access & issues, copying, mail, packages
- **R. Barrett Laurie**, 105 Tucker Hall, laurieb@missouri.edu
  --DBS Business manager; fiscal-related questions
- **Jared Seals** and **Nick Valentine**, 3 Tucker Hall, bioit@missouri.edu
  --IT issues (except personal computers or devices)
- **Voronica Bonaparte**, 107 Tucker Hall, BonaparteV@missouri.edu
  --appointment and payroll-related issues
- **Talia Gholson**, 106 Middlebush, gholsont@missouri.edu
  --HR-related issues
- **Steve Heinrich,** 17 Tucker Hall, heinrichs@missouri.edu
  --issues with shared research equipment

Graduate School Staff Support

- **Carli Hess**, hesscar@missouri.edu
  -- Academic Advisor for Doctoral Students
- **Ryan Adkins**, adkinsjr@missouri.edu
  -- Academic Advisor for Master's Students
- **Dr. Liz Bent**, benteo@missouri.edu
  -- External Fellowship Support, Grant Development
- **Karen Gruen**, gruenk@missouri.edu
  -- Questions about tuition waivers and medical insurance
- **Dr. Laura Roesch** and **Audra Jenkins**, 201 Student Success Center
  Graduate Career Coaches

APPLICATION & ADMISSION

The Division of Biological Sciences offers two graduate degrees: the Master of Arts (M.A.) degree and the Doctor of Philosophy (Ph.D.) degree.

Admission

Applicants to the Division of Biological Sciences graduate education program are considered once a year for Fall admission, with a December 1 application deadline. All applicants must fulfill the minimum admission requirements of the Graduate School and show likelihood of successfully completing the Divisional program.

Application Process

The Division of Biological Sciences prioritizes evidence of attributes such as drive, diligence, passion for sharing scientific knowledge, and a willingness to take scientific risks over metrics such as GPA, standardized test scores, and other similar quantifications. Therefore, the application process should be seen as an opportunity to highlight these attributes through essays and letters of reference.

Application Materials (for M.A. and Ph.D.)

- Transcripts from each college or university attended. Unofficial copies of transcripts can be uploaded as part of the application process. If offered admission, students are required to submit official transcripts to the Graduate School. International students coming from overseas may hand deliver their official transcripts to the Graduate School (as opposed to mailing them); official transcripts must be submitted by the first semester or students will not be allowed to register for a second semester.
- Research Essay describing previous research experience and how it has influenced the topic(s) being pursued for graduate school.
- Personal Statement discussing reasons for interest in pursuing a graduate education.
- Names and contact information for three references who have agreed to write letters of recommendation, preferably those who can comment on your potential for success in graduate work and as a teaching assistant.
- Current resume or CV
- English Language Proficiency Exam. Students whose first language is other than English must take an English language proficiency test. Students who obtain a speaking score of 26-27 (8) on the TOEFL (IELTS) can be considered for a Teaching Assistantship in the Biological Sciences (see MU's International Teaching Assistantship Program for details).

GRE Scores

The Division of Biological Sciences does not accept Graduate Record Examination (GRE) scores as criteria for admission to the graduate program. Applications that include GRE scores will have the scores removed before any evaluation occurs by the faculty or GEC.

Application Fee Waiver

Faculty may ask to have the application fee for select applicants waived. To do this, faculty should send an email to the graduate education staff contact person (currently, Melody Kroll, krollmm@missouri.edu) requesting the fee waiver on behalf of a student along with a MoCode for the fee cost.

Admission Process

All regular faculty are invited to review applications and provide feedback on applicants. The Graduate Education Committee considers all feedback provided, and select candidates are invited to interview. Admission decisions are based on the interview and the applicant's record.

Final admission is contingent upon receipt of all required application materials and formal review and acceptance of the student's academic credentials by the Graduate School at the University of Missouri.

Off-Cycle Admission

Students may opt to defer their admission for one year. Deferring until the Spring semester is not allowed. Special circumstances arise when students start during Summer semester. A graduate student starting in the summer term will pursue full-time research for at least ten weeks that summer with a Biological Sciences faculty member agreeing to supervise the research. In most cases, the student is hired in on a non-qualified title (e.g., job code 4710) for the summer. Domestic students may enroll in up to 5 credit hours of BIO_SC 7990, and international students must enroll in 5 credit hours their first summer. The student's performance is reflected in an assigned grade, which is communicated to Dr. Gerry Summers.

New Student Orientations

All newly admitted graduate students to the Division of Biological Sciences are required to attend the following orientations. TA training is required even if the student will not TA immediately.

- New Graduate Student Orientation, MU Graduate School
- Graduate Teaching Orientation (GTO)
- Division of Biological Sciences TA orientation, hosted by Dr. Summers
- Division of Biological Sciences New Student Orientation, hosted by the DGS and GEC
- International Student Orientation (as applicable)
- Fellowship Orientation (as applicable)

ASSISTANTSHIPS

Applicants to the graduate program who are accepted with an Assistantship are given a full academic year appointment. Support beyond the first year is contingent on the student's (1) performance as a GTA/GRA and (2) performance in graduate courses. In principle, the Division is committed to provide some form of financial support to all qualified Ph.D. (M.A.) students through the first 5 (3) years of graduate study. This support may be from internal or external sources. In most cases, support comes in the form of a 0.5 FTE Teaching Assistantship (TA). This may be supplemented by research assistantships, grants, and fellowships. An Assistantship includes a competitive stipend, student medical insurance, and tuition for all qualifying full-time students. Tuition waivers are subject to time limits by the Graduate School (5-7 years/10-14 semesters for Ph.D. students with/without a Master's degree) and 3 years/6 semesters for Master's students (see GSSP below).

Stipends

The base 2023-2024 stipend (for the two academic-year semesters) is $22,500. An additional $6,000 summer salary is added to increase each student's yearly stipend to a total of $28,500. Total stipend for AY23/25 is $28,500. The stipend amount for students supported on an RA must be at least this amount. The graduate student stipend includes compensation specifically for service-related activities that benefit the Division. Thus, all graduate students are expected to engage in service, including (but not limited to) graduate student and faculty recruiting activities, outreach relevant to the mission of the Division, participating in BGSA meetings and events, attending DBS-sponsored events (retreat, seminars, etc.), and serving on Divisional committees as appropriate.

Graduate Student Support Program (GSSP)

Graduate students with a qualifying assistantship (0.5 FTE) are eligible for a fee waiver administered by the Graduate Student Support Program (GSSP). The GSSP fee waiver covers the student's educational fees. The GSSP does not cover mandatory fees: student health fee, (AY23-24: $100.80 flat rate/semester), recreation center fee (AY23-24: $176.40 flat rate/semester), student activity fee (AY23-24: $26.37/credit hour up to 9 hours/semester), and (as applicable) international student services fee. The student is responsible for these mandatory fees plus any late fees unless an arrangement other than the GSSP fee waiver has been made.

External Grant Graduate Research Assistants (GRAs)

GRAs are appointed by individual faculty members with funded research grants. Work time and compensation rates are similar to those of GTAs. Application must be made to the faculty member holding grants.

Appointment Duration

Assistantships are made on a yearly basis. On occasion, an assistantship may be for a single semester. Assistantships may be terminated during the academic year if a student's performance is documented to have been unreliable, unprofessional, or otherwise unacceptable.

M.A. DEGREE REQUIREMENTS

Summary of Degree Requirements

- Select a Primary Advisor
- Enroll in BIO_SC 8050 (Fall, Year 1), BIO_SC 8060 (Spring, Year 1), BIO_SC 8087 (4 semesters) and BIO_SC 8187-1 (4 semesters).
- Determine additional coursework to meet 30 credit hour requirement
- Complete a Plan of Study with the Advisor (M1 form)
- Design a thesis project in consultation with Primary Advisor
- Form a thesis committee (M2 form) and meet annually (Annual Committee Mtg Form)
- Maintain full enrollment (least 9 credits in the Fall and Spring semesters, 5 in the Summer)
- Maintain a GPA of 3.0
- Submit an annual evaluation of progress and meet with the GEC annually (Spring)
- Satisfactorily perform duties associated with Assistantship or Fellowship
- Conduct thesis research
- Write, orally defend, and submit research thesis (M3 Form)
- Submit Division's M3-A Form
- Be a good citizen of the Division

Academic Process for M.A. Students

Step 1: Select Primary Advisor

The student selects a consenting Advisor from faculty members of the academic program in which the major work is planned. Graduate students conducting thesis or dissertation research under the supervision of a faculty member who is not a member of the Division of Biological Sciences must arrange to have a "Co-Advisor" from the Division. The choice of Primary Advisor is subject to final approval by the faculty member, the Division's DGS, GEC, and the Division's Director. The Primary Advisor should be selected by the end of the student's first semester. Any change to the Primary Advisor must be reported to the Graduate School by completing the Application For Graduate Change of Program, Degree, Emphasis, or Advisor form.

Step 2: Form Thesis Committee

The thesis committee is responsible for 1) the composition, administration, and evaluation of the student's Program of Study, 2) advising the student throughout graduate study, and 3) evaluation of the thesis and the final defense.

A thesis committee is composed of three members of the MU faculty: a major Advisor from the academic program; a second reader from the academic program; and a third reader from either the academic program or member of the graduate faculty from a different MU graduate program. A student's thesis committee must be communicated to the Graduate School via the M2 – Request for Thesis Committee Form. Any changes to the composition of the thesis committee (other than the principal Advisor) must be

reported to the Graduate School using the Change of Committee form. The first meeting of the student's Thesis Committee should occur before the end of the Spring semester of Year 1.

Step 3: Submit Program of Study

After performing satisfactorily for a minimum of one semester, the student completes the Program of Study for the Master's degree with the thesis committee's assistance. The Program of Study should be the focus of the student's first meeting with the thesis committee, and the M1 – Program of Study for the Master's Degree Form should be completed and signed at this meeting. The M1 form must be filed with the Graduate School by the end of the student's second semester of enrollment. Upon approval of the Program of Study by the Graduate School, the student is a candidate for the degree.

The student is required to complete all courses listed on the M1 form prior to the degree being granted. If a change is necessary to a student's approved Program of Study form, a Plan of Study Course Substitution Form must be completed and filed with the Graduate School prior to applying for graduation.

Step 4: Carry Out Research

Each candidate must pass a final examination to demonstrate mastery of the fundamental principles of the work included in the course of study offered for the degree. A written thesis, based upon original research, that is student's own work and that demonstrates a capacity for research and independent thought is required. The student must defend their thesis research to their thesis committee prior to initiating their thesis research project.

It is the responsibility of the student to meet with their thesis committee on an annual basis to update them on the progress of their research. In DBS, annual meetings with the thesis committee are required.

It is the responsibility of the student to schedule these annual meetings. At these annual meetings, the student should provide an update on the status of their research and if any goals have changed. The committee should provide feedback on the student's research direction and also assess the student's progress toward their research goals and other milestones. The annual assessment of student progress is communicated to the DGS via the Division's Annual Committee Meeting Report Form.

Students who have not met with their committee in over a year will not be allowed to register for research credits (BIO_SC 8090) and will be subject to academic probation.

Step 5: Write Research Thesis

Upon completion of research, and with the approval of the Primary Advisor and thesis committee, the student will prepare a thesis. The student is responsible for adhering to the Graduate School Guidelines for preparation of the thesis. The GEC recommends the

Style Manual published by the Council of Biology Editors, Inc. for questions of punctuation, capitalization, and other matters of general style, and the format of the premier journal in the discipline of research for references with the full title and inclusive page numbers of the articles. All other matters of style to be at the discretion of the Primary Advisor.

The student must provide a complete draft of the thesis to their Advisor ONE MONTH prior to the defense date. The student should allow at least two weeks for revisions with their Advisor prior to submission to their committee. The committee should have two weeks to review the thesis prior to the defense. Failure to meet these deadlines can result in postponement of the defense.

Step 6: Defend Research Thesis

The thesis defense involves a public research seminar followed by a closed meeting of the candidate with the thesis committee. No less than TWO WEEKS prior to the defense, candidates should provide the DGS with (a) the title of the thesis, (b) the date and location of the seminar, and (c) complete a trifold that gives an overview of their graduate career. (A template trifold can be obtained on the Division's Teams site.) This information is shared via email and select information from the trifold may be posted to the Division's website and social media accounts.

The public defense takes place in a public forum at a time and venue determined by the thesis committee. During a defense, a student may be asked questions by members of the committee as well as by anyone in attendance. In DBS, the defense is 45 minutes long plus 15 minutes for questions and answers. The defense should be scheduled as part of the Division's Seminar Series or Graduate Seminar course.

The closed defense with the thesis committee should occur immediately after the public defense. (The Division's DGS must be notified by email if the closed-door defense cannot be scheduled on the same day as the seminar.) At the closed defense, committee members may ask additional questions of the student about the research presented in the thesis and may request changes. At the end of this closed meeting, the student will leave, and the thesis committee is given time to decide on whether to approve the dissertation and, as necessary, on what conditions.

The decision of the committee is communicated to the Graduate School via the M3 – Report of the Master's Degree Examining Committee Form, which must be completed and signed by all committee members and then forwarded through the DGS to the Graduate School by the semester deadline.

Step 7: Submit Thesis to the Graduate School

It is the student's responsibility to follow the Graduate School's guidelines on the order and format of the master's thesis. Submission occurs through the student's Canvas site and includes supplementary paperwork, including an electronic release form, signed

approval page, and a publishing agreement form. The student is responsible for paying the required processing fee.

The Graduate School has strict deadlines for thesis submissions. It is the responsibility of the student to be aware of and meet these deadlines.

Step 8. Apply to Graduate

All students wishing to graduate must complete all credit requirements; write and orally defend a thesis; apply for graduation; and submit all required forms and paperwork. It is the student's responsibility to check with the Graduate School to be sure all requirements have been met, including completion of any delayed grades, well before the semester deadlines. It is also the student's responsibility to check the Graduate School website for graduation application deadlines and to submit all required materials for degree completion.

The student is responsible for completing the Application for Graduation found on the Graduate School website by the deadline. The student must be admitted and actively pursuing the degree they plan to complete; in other words, the student must be enrolled in the minimum number of credit hours the semester they complete their degree, including summer. Students who need to switch their application from Spring to Summer or withdrawal their application must contact the M.A. Advisor for the Graduate School. Students can incur a fee for switching or withdrawing their application.

Step 9: Attend Commencement

Students must RSVP with the Graduate School to attend commencement. The deadline to be listed in the commencement book is earlier than the deadline to attend. It is the responsibility of the student to be aware of these deadlines.

The Spring semester ceremony is held in May, and the Fall semester ceremony is held in December. A student completing a degree during the Summer should review the Graduate School's summer participation policies.

The Division hosts an informal hooding ceremony for its graduates prior to the commencement ceremony in May. Students who will be completing the M.A. degree in the Spring or Summer as well as the previous Fall are invited to participate.

Students can purchase regalia from the MU Bookstore, and faculty can rent or purchase regalia through the Mizzou Store. The Division has one regalia set available for faculty in Tucker 105 and two regalia sets for graduate students in Tucker 218. The regalia are loaned out on a first-come/first-served basis and must be returned promptly.

Non-thesis M.A. Option

In DBS, a non-thesis option is available only to students who transfer from the Ph.D. program to the M.A. program. This transfer needs to be approved by the DGS and is evaluated on an individual basis. Where no thesis is presented by the candidate, a

committee, composed of three DBS members, is designated as the final examination committee. The final exam may be a substantial independent project or the comprehensive exam. With a non-thesis M.A., the M2 – Request for Thesis Committee Form is not required.

Coursework Required for M.A. Degree

Minimum credit requirement

MU requires a minimum of 30 hours of graduate credit beyond the bachelor's degree (or its equivalent) for a master's degree. Fifteen of the 30-hour minimum must be selected from courses numbered at 8000 or 9000 level. No more than 40 percent (12 credit hours) of the 30-hour credit requirement can be satisfied by research courses (e.g., BIO_SC 8090). A student's thesis committee must approve all coursework used to satisfy the credit-hour requirement and may require additional course work beyond these minimums.

Courses

BIO_SC 8050, Professional Skills*	Year 1, Fall	2 h
BIO_SC 8060, Ethical Conduct of Research*	Year 1, Spring	1 h
BIO_SC 8087, DBS Seminar*	4 semesters	4 h
BIO_SC 8187-1, Graduate Student Seminar*	4 semesters	4 h
BIO_SC 8090, Research*		12 h
Courses in research area (8000, 9000 level)		≥ 7 h
Total		30 h

*Courses required by the Division of Biological Sciences

Length of Study Policy

The program for the M.A. degree must be completed within a period of three (3) years beginning with the first semester of enrollment in which the student is accepted to a degree program. For any extension of this time limitation, the student must petition their faculty Advisor/mentor and the DGS in writing prior to the end of the 5th semester of enrollment in the program. The DGS will notify the Advisor in writing of the decision.

Good Academic Standing

A student's academic standing in the Division is based on:

- A GPA of 3.0 or greater. When a student's GPA falls below 3.0, receives more than 2 C's in graduate courses, or spends two consecutive semesters on academic probation, they will be notified in writing that their performance is not satisfactory.
- Satisfactory research performance, as judged by the Primary Advisor.
- Satisfactory performance toward assistantship.

- Full-time enrollment.

Unsatisfactory performance can result in dismissal from the M.A. program. The decision regarding a student's standing in the Division is made by the DGS in consultation with the Primary Advisor and GEC and can be appealed to the Division's Director, and then to the Graduate Faculty Senate Committee on Graduate Student Appeals.

Details on procedures for appeal to the Division and Graduate Faculty Senate can be found at: https://gradschool.missouri.edu/policy/probation-termination-and-appeals/

PH.D. DEGREE REQUIREMENTS

Summary of Degree Requirements

- Select a Primary Advisor
- Form and meet with a Doctoral Program Committee (D1 form)
- Enroll in BIO_SC 8050 (Fall, Year 1), BIO_SC 8060 (Spring, Year 1), BIO_SC 8087 (10 semesters) and BIO_SC 8187-1 (6 semesters)
- Determine additional coursework to meet 72 credit hour requirement
- Complete a Plan of Study (D2 form)
- Maintain full enrollment (at least 9 credits in the Fall and Spring semesters, 5 in the Summer)
- Maintain a GPA of 3.0
- Design a dissertation project in consultation with Primary Advisor and Doctoral Program Committee
- Meet annually with Doctoral Program Committee (Annual Committee Mtg Form)
- Submit an annual evaluation of progress to the Division's GEC
- Satisfactorily perform duties associated with Assistantship/Fellowship
- Satisfactorily pass the Comprehensive Examination within 3 years of enrollment (D3 Form)
- Satisfactorily perform dissertation research under supervision of Primary Advisor and Doctoral Program Committee
- Satisfactorily write, defend, and submit research dissertation (D4 form) within 5 years of enrollment
- Be a good citizen of the Division

Academic Process for Ph.D. Students

Step 1: Select Primary Advisor

The student identifies a consenting Advisor from faculty members of the Division of Biological Sciences. Adjunct faculty may or may not serve as the Primary Advisor depending on their doctoral status with the Graduate School. Graduate students conducting thesis or dissertation research under the supervision of a faculty member who is not a member of the Division of Biological Sciences must arrange to have a "co-Advisor" from the Division. The choice of Advisor is subject to final approval by the faculty member, the Director of Graduate Studies, GEC, and the Division Director.

The Primary Advisor should be selected by the end of the student's second semester. Any change to the Primary Advisor must be reported to the Graduate School by completing the Application For Graduate Change of Program, Degree, Emphasis, or Advisor form.

Step 2: Form Doctoral Program Committee

The Doctoral Program Committee is responsible for 1) the composition, administration, and evaluation of the student's Program of Study, 2) advising the student throughout graduate study, 3) evaluation of the written and oral portions of the Comprehensive Examination, and 4) evaluation of the dissertation and the final defense.

The Doctoral Program Committee is composed of a minimum of four members of the MU Graduate Faculty. The Doctoral Program Committee must include 3 members from the Division of Biological Sciences; the fourth member may be from the Division or from a different academic department. A student's Doctoral Program Committee must be communicated to the Graduate School via the D1 – Qualifying Examination Results and Doctoral Committee Approval Form. Any changes to the composition of a Doctoral Program Committee (except the Primary Advisor) must be reported to the Graduate School using the Change of Committee form.

Step 3: Complete Program of Study/Qualifying Exam

The first meeting of the student's Doctoral Program Committee should occur before the end of the Spring semester of Year 1. The purposes of the first meeting are to introduce the scientific interests and goals of the student to the committee and to complete/approve the student's Plan of Study. At this meeting, D2 – Plan of Study for the Doctoral Degree Form (Page 2 template) should be completed and then submitted to the DGS. The Division does not require a student to have a project and/or preliminary data to complete the D1 or D2 forms. Completion of the first meeting and signing of these two forms constitutes the **Qualifying Examination** for the Division.

The bulk of a student's Program of Study should be completed by the end of Year 2. The student is required by the Graduate School to complete the courses listed on the D2 form. If a change is necessary to a student's approved Program of Study form, a Plan of Study Course Substitution Form must be completed and filed with the Graduate School prior to applying for graduation.

Step 4: Pass Doctoral Comprehensive Examination

The doctoral degree requires successful completion of the Comprehensive Exam. Per the Graduate School, a student must substantially complete the course work outlined in the Plan of Study to the satisfaction of the Doctoral Program Committee (and with a GPA of 3.0 or higher) before taking the comprehensive examination. The Graduate School requires completion of the Comprehensive Exam at least seven months before the final defense of the dissertation. DBS recommends that the Comprehensive

Examination be completed as early as the end of the student's second year (semester 4) and recommends it take place before the end of the student's third year (semester 6).

The comprehensive examination consists of written and oral sections. Most advisors in the Division require students to write a proposal about their intended dissertation research and present it to the Doctoral Program Committee. In the Division, the format of the written part of the exam usually takes the format of an NIH or NSF predoctoral fellowship proposal. The oral component is the oral defense of the proposal and responses to questioning by the committee. The aim of the comprehensive exam is to ensure that students understand both their field and research focus.

The decision of the committee is recorded on the D3 - Doctoral Comprehensive Examination Results Form and submitted to the DGS (for forwarding to the Graduate School) for submission to the Graduate School. The Graduate School requires the D3 form be submitted no later than two weeks after the comprehensive examination is completed.

A failure of either the written or oral section of the exam constitutes failure of the comprehensive exam. If a failure is reported, the committee must include in the report an outline of the general weaknesses or deficiencies of the student's work. The student and the committee members are encouraged to work together to identify steps the student might take to become fully prepared for the next examination. If the student believes that the advice given by the committee is inadequate, the student may send a written request for clarification to the committee. A copy of this request should be sent to the Graduate School as well. The committee must respond to this request in writing within two weeks and a copy must be filed with the Graduate School. The student who fails may not take a second comprehensive examination for at least 12 weeks. Less than full committee approval on the second attempt may result in the student being dismissed from the program or a transfer to the M.A. program. The latter option must be discussed and approved by the student's thesis committee, including what will constitute completion of the M.A. degree (a project or comp exam). A request to transfer to the M.A. program must be submitted in writing to the DGS for consideration and final approval. Students who transfer to the M.A. program must complete and complete the Application For Graduate Change of Program, Degree, Emphasis, or Advisor form.

Continuous enrollment after the exam. Students must maintain continuous enrollment during their candidacy (the period after successful completion of the comprehensive examination). Candidacy is maintained by enrolling in at least 2 credits hours each fall and spring semester and 1 credit hour during the summer semester, up to and including the term in which the dissertation is defended. Continuous enrollment provides access to an Advisor's support, doctoral program committee guidance and university research facilities for completion of the dissertation. Failure to enroll continuously until the

doctoral degree is awarded terminates candidacy.

Step 4: Carry out Research

In DBS, annual meetings with the Doctoral Program Committee are required. It is the responsibility of the student to schedule these annual meetings.

At these annual meetings, the student should provide an update on the status of their research and if any goals have changed. The committee should provide feedback on the student's research direction and also assess the student's progress toward their research goals and other milestones. The annual assessment of student progress is communicated to the DGS via the Division's Annual Committee Meeting Form.

Students who have not met with their committee in over a year will not be allowed to register for research credits (BIO_SC 9090) and will be subject to academic probation.

Step 5: Write Dissertation

Upon completion of research, and with the approval of the Primary Advisor and Doctoral Program Committee, the student will prepare a dissertation. The student is responsible for adhering to the Graduate School guidelines regarding the preparation and format of the dissertation. The GEC recommends the Style Manual published by the Council of Biology Editors, Inc. for questions of punctuation, capitalization, and other matters of general style, and the format of the premier journal in the discipline of research for references with the full title and inclusive page numbers of the articles. All other matters of style to be at the discretion of the Primary Advisor.

The student must provide a complete draft of the dissertation to their Primary Advisor ONE MONTH prior to the defense date. The student should allow at least two weeks for revisions with their advisor prior to submission to the Doctoral Program Committee. The committee should have TWO WEEKS to review the thesis prior to the defense. The students should allow TWO WEEKS minimum after the closed-door defense for revisions prior to final submission of the dissertation to the Graduate School. Failure to meet these deadlines can result in postponement of the defense.

Step 6: Defend Dissertation

The dissertation defense involves a public research seminar followed by a closed meeting of the candidate with the thesis committee. At least TWO WEEKS prior to the defense, candidates should provide the DGS with (a) the title of the thesis, (b) the date and location of the seminar, and (c) complete a trifold that gives an overview of their graduate career. (A template trifold can be obtained on the Division's Teams site.) This information is shared via email and select information from the trifold may be posted to the Division's website and social media accounts. Failure to meet these deadlines can result in postponement of the defense.

The research seminar takes place in a public forum at a time and venue determined by

the thesis committee. During the seminar, a student may be asked questions by members of the committee as well as by anyone in attendance. In DBS, the seminar is 45 minutes long plus 15 minutes for questions and answers. The seminar should be scheduled as part of the Division's regular seminar series or Graduate Seminar course.

The closed defense with the thesis committee occurs immediately after the public defense. (The Division's DGS must be notified by email if the closed-door defense cannot be scheduled on the same day as the seminar.) At this closed defense, committee members may ask additional questions of the student about the research presented in the thesis and may request changes. At the end of this closed meeting, the student will leave, and the thesis committee is given time to decide on whether to approve the dissertation and, as necessary, on what conditions.

The D4 - Report of the Dissertation Defense Form reports whether the student has successfully orally defended the dissertation. The form must be completed and signed by all committee members and then forwarded through the DGS to the Graduate School by the semester deadline. For the dissertation to be successfully defended, the student's doctoral committee must vote to pass the student on the defense with no more than one dissenting or abstaining vote.

Step 7: Submit Dissertation to the Graduate School

Submission occurs through the student's Canvas site and includes supplementary paperwork, including an electronic release form, signed approval page, and a publishing agreement form. There is also a processing fee that must be paid. The Graduate School has strict deadlines for dissertation submissions. It is the responsibility of the student to be aware of and meet these deadlines.

Step 8. Apply to Graduate

All students wishing to graduate must complete all credit requirements; successfully complete the comprehensive exam (if PhD); write and orally defend a dissertation/thesis; apply for graduation; and submit all required forms and paperwork. It is the student's responsibility to check with the Graduate School to be sure all requirements have been met, including completion of any delayed grades, well before the announced deadlines. It is also the student's responsibility to check the Graduate School website for graduation application times and to submit all required materials for degree completion.

The student is responsible for completing the Application for Graduation found on the Graduate School website by the deadline. The student must be admitted and actively pursuing the degree they plan to complete; in other words, the student must be enrolled in the minimum number of credit hours the semester they complete their degree, including summer. Students who need to switch their application from Spring to Summer or withdrawal their application must contact the Ph.D. Advisor for the Graduate School. There is an application fee to graduate. Students can incur an additional fee by

switching or withdrawing their application.

Step 9: Attend Commencement

Students must RSVP with the Graduate School to attend commencement. The deadline to be listed in the commencement book is earlier than the deadline to attend. Students will receive emails about these deadlines from the Graduate School. Spring semester ceremonies are held in May and Fall semester ceremonies are held in December. Students completing degrees during the Summer should review the summer participation policies.

DBS hosts an informal hooding ceremony for its graduates prior to the commencement ceremony in May. Students who will be completing the Ph.D. degree in the Spring or Summer as well as the previous Fall are invited to participate.

Students can purchase regalia from the MU Bookstore, and faculty can rent or purchase regalia through the Mizzou Store. The Division has one regalia set available for faculty in Tucker 105 and two regalia sets for graduate students in Tucker 218. These are loaned out on a first-come/first-served basis and must be returned promptly.

Coursework Required for Ph.D. Degree

Minimum credit requirement

MU requires a minimum of 72 hours of graduate credit beyond the bachelor's degree (or its equivalent) for a doctoral degree. Fifteen of the 72-hour minimum must be selected from courses numbered at 8000 or 9000 level. A student's dissertation committee must approve all coursework used to satisfy the credit-hour requirement and may require additional course work beyond these minimums.

Required Courses

BIO_SC 8050, Professional Skills*	(Year 1, Fall)	2 h
BIO_SC 8060, Ethical Conduct of Research*	(Year 1, Spring)	1 h
BIO_SC 8087, DBS Seminar*	(10 semesters)	10 h
BIO_SC 8187-1, Graduate Student Seminar*	(6 semesters)	6 h
Courses in research area of focus (8000, 9000 level)		≥ 15 h
BIO_SC 9090, Research toward dissertation		~38 h
Total		72 h

*Required courses for the Division of Biological Sciences

Length of Study Policy

The program for the Ph.D. degree must be completed within a period of five (5) years beginning with the first semester of enrollment in which the student is accepted to a degree program. For

any extension of this time limitation, the student must petition their faculty Advisor/mentor and the DGS in writing prior to the end of the 9th semester of enrollment in the program. The DGS will notify the Advisor in writing of the decision.

Good Academic Standing

A student's academic standing in the Division is based on:

- A GPA of 3.0 or greater. When a student's GPA falls below 3.0, receives more than 2 C's in graduate courses, or spends two consecutive semesters on academic probation, they will be notified in writing that their performance is not satisfactory.
- Satisfactory research performance, as judged by the Primary Advisor
- Successful completion of Comprehensive Examination with a "Pass" decision
- Satisfactory performance toward assistantship.
- Full-time enrollment.

Unsatisfactory performance for failure to meet the usual examination and grade requirements can result in dismissal from the Ph.D. program. The decision regarding a student's standing in the Division is made by the DGS in consultation with the Primary Advisor and GEC and can be appealed to the Division's Director, and then to the Graduate Faculty Senate Committee on Graduate Student Appeals. Details on procedures for appeal to the Division and Graduate Faculty Senate can be found at: https://gradschool.missouri.edu/policy/probation-termination-and-appeals/

COURSES

Required Courses

BIO_SC 8050, Professional Skills

This course is required of all Biological Sciences graduate students. We recommend students complete this course their first semester of their first year. (Only offered in the Fall.) The objective of this course is to provide first year graduate students with a forum to discuss the following topics: current issues of inclusion and equity, particularly as it relates to STEM fields and more generally academia, the mentor-mentee dynamics including the discussion of a COMPACT, implicit bias and microaggression, transition from undergraduate to graduate students, what is different? and what is expected? and formation of a committee, what to keep in mind when forming a committee.

BIO_SC 8060, Ethical Conduct of Research

This course is required of all Biological Sciences graduate students. We recommend students complete this course their first semester of their first year. (Only offered in Spring) Discussion of ethical issues in biological research, including the rules and conventions for appropriate research conduct. Graded on S/U basis only.

BIO_SC 8087, DBS Seminar

Students should enroll in this course every Fall and Spring semester throughout their graduate career. The course invites speakers to address current topics in the biological sciences. Graded S/U basis only.

BIO_SC 8187, Graduate Student Seminar

Students should enroll in this course every Fall and Spring semester in Years 1-3. Although enrollment is not necessary after year 3, students are strongly encouraged to attend. This course combines targeted professional development talks with student seminars. The goal is to give students multiple opportunities to give oral presentations and updates about their research throughout their graduate career. Students are invited to give a talk about their first-year projects at the end of the Spring semester and give updates about their research during the Fall semester of their third year and the Spring semester of their fourth year. Students are strongly encouraged to schedule their thesis/dissertation defense during Graduate Student Seminar.

BIO_SC 8090/9090, Research Toward M.A. Thesis/Ph.D. Dissertation

Students doing research toward the M.A. degree register for BIO_SC 8090, and students doing research toward the Ph.D. program register for BIO_SC 9090.

Highly Recommended Courses

BIO_SC 7990, Research Rotations

This course is used for research rotations. The purposes of rotations for the student include learning about laboratories of potential thesis Advisors, learning new techniques, and exploring new areas of science. Thus, rotations in very different focus areas are highly recommended.

Rotations are usually four weeks or eight weeks in duration. The length of the rotation is determined by the student and the student's Primary Advisor (if known) in consultation with the sponsoring PI. Generally, 1 credit is equivalent to a 4-week rotation and 2 credits is equivalent to an 8-week rotation. A permission number is required to register for BIO_SC 7990. Students must provide the name(s) and durations of the rotations to obtain a permission number.

During a rotation, the student is expected to perform as a full member of the laboratory. The student should have a desk and laboratory bench and a defined project supervised and guided by a member of the laboratory. One-half of the student's time and effort should be directed toward the rotation project, the other half toward course work. The rotation laboratory should serve as an academic home and the student should participate in all usual laboratory activities, particularly weekly group meetings. The student should present an oral report about the research pursued to the host laboratory at the end of the rotation period.

Each sponsoring faculty member will provide Dr. Gerry Summers with an assessment of the student's performance ***in the assignment of a grade.***

BIO_SC 8640, Quantitative Methods in Life Sciences

Drs. Elizabeth King and Kevin Middleton (Offered Every Spring semester). This is a graduate-level course in statistical analysis designed for the specific needs of students in life sciences, focusing on statistical literacy: performing, interpreting, and writing about biological data analysis. As such, the course assumes a basic understanding of some topics and little understanding of other topics. The course will cover most topics broadly and occasionally in great depth, highlighting the perils and pitfalls of different methods, while providing guidelines for a wide array of statistical approaches to data analysis. The course seeks to find the balance between really understanding all the math involved and learning to be a competent practitioner and consumer of analysis, emphasizing the practical over the theoretical, with additional focus on the communication of data (plotting, graphs, figures) and of results. Graded on A-F basis only.

Elective Offerings (FS23, SP24)

BIO_SC 7500, Neurobiology

Fall 2023-Dr. Bing Zhang. The main objective of this class is to provide students with the framework to understand how brain cells (neurons and glia) work at molecular, cellular, and network levels and at system levels so that students will better understand the nervous system. This includes the mastery of basic neurobiology concepts and understanding of key experimental methodologies. The content covers ion channels and membrane potentials, neuronal excitability, synaptic transmission and synaptic plasticity, basic brain anatomy, somatosensory system, visual system, chemical senses, and learning and memory. An equally important objective of this course is to enhance your critical thinking and active learning skills such that you can integrate diverse topics to appreciate the complexity of neuronal and glial structure and function and apply your knowledge to analyzing or interpreting new findings in the field. The lecture and discussion materials come from a free online textbook and original research articles. Students are evaluated for their participation in class discussions, quizzes and group projects.

BIO_SC 7590, Computational Neuroscience

Fall 2023, Dr. Satish Nair. An interdisciplinary course with a strong foundation in quantitative sciences for students in biological and behavioral science and an introduction to experimental methods for students from quantitative sciences.

BIO_SC 7640, Behavioral Biology

Fall 2023, Dr. Johana Goyes Vallejos. *Description not currently available.*

BIO_SC 8187-(2–12), Seminar in Area of Specialization

Fall 2023, Spring 2024, Variable Instructors. Some faculty offer seminars specific to graduate students in their labs. These seminars are designed by the faculty member in conjunction with the student and usually include directed readings of primary literature in the area of study and lab meetings. If available, the student will sign up for the section specific to their mentor. For example, a graduate student in Dr. Leal's lab would register for 8187-06 in Fall 2023. Mentors who wish to set up a BIO_SC 8187 section for their lab should contact Dr. Gerald Summers.

BIO_SC 8300, Advanced Plant Genetics

Fall 2023, Dr. James Birchler. This course will be taught by several members of MU's Interdisciplinary Plant Group (IPG) and is designed to be accessible to every new or advanced graduate student interested in plant biology and genetics. Topics covered include Mendelian genetics, molecular and QTL mapping, transposable elements, aneuploidy and ploidy, genome editing, epigenetics, system genetics, computational genetics and prediction, and more. It includes short student presentations on a future direction of plant genetics/genomics.

BIO_SC 8440, Integrative Neuroscience 1

Fall 2023, Dr. Anand Chandrasekhar. This course is the first part of a two-semester sequence offered by the Interdisciplinary Neuroscience Program (INP). The course will be taught by several INP faculty and is designed to be accessible to every new or advanced graduate student interested in the neurosciences. Integrative Neuroscience I will discuss topics in molecular, cellular, and developmental neuroscience and neurophysiology, with an emphasis on diseases of the nervous system. The recommended textbook for both courses is "Fundamental Neuroscience" Fourth Edition (Academic Press, 2012) by Larry Squire et al. An electronic copy (PDF file) will be provided.

BIO_SC 8442, Integrative Neuroscience 2

Spring 2024, Dr. Anand Chandrasekhar. This course is the second part of a two-semester sequence offered by the Interdisciplinary Neuroscience Program (INP). The course will be taught by several INP faculty and is designed to be accessible to every new or advanced graduate student interested in the neurosciences. Integrative Neuroscience II will discuss systems, behavioral, and cognitive neuroscience. The recommended textbook for both courses is "Fundamental Neuroscience" Fourth Edition (Academic Press, 2012) by Larry Squire et al. An electronic copy (PDF file) will be provided.

BIO SC 8724, College Science Teaching

Fall 2023, Dr. Marcelle Siegel. This course is designed for STEM graduate students who are interested in improving their science teaching or are interested in pursuing careers in college science teaching. The central question of the course is, "How do college students best learn science and engineering and thus how do we best teach them?" By the end of this course, students will have a deeper understanding of what it means to learn science/engineering; know how to set goals for student learning; understand the essential features of inquiry-based science instruction; develop a repertoire of interactive teaching strategies for diverse learners that address learning goals in large lectures, discussion sections, and the laboratory; understand the importance of linking assessment with learning goals; develop a repertoire of equitable assessment strategies and scoring techniques; synthesize your understanding of goals, strategies, and assessment to apply to the evaluation and development of college STEM curricula; and develop the disposition to reflect on practice and seek out continuing opportunities for professional development.

BIO SC 8002, Pedagogical Prep for Biological Science TAs

Spring 2024, Dr. Mitra Asgari. This course is designed for graduate students, with different levels of prior teaching experience and familiarity with pedagogical concepts, who help science courses. The main goals of this course are for GTAs 1) to become familiar with the basic elements of scientific teaching, 2) to practice and improve inclusive and evidence-based teaching techniques; 3) to monitor, reflect, and asses teaching and learning in their classrooms. In addition to engaging in related discussions and activities, another goal of this course is to create a community of science GTAs who can provide longer-term teaching support to each other.

BIO SC 8642, Quant Methods in Life Sciences II

Spring 2024, Drs. Elizabeth King and Kevin Middleton. This course takes an in-depth look at advanced statistical topics widely used in the life sciences. Students are welcome to choose the modules of interest, with the hopes that they apply to their research. There are multiple topics available, including: 1) nonlinear statistics, 2) multivariate statistics, 3) structural equation modelling, 4) correlation structures (phylogenetic and kinship methods), 5) experimental design, 6) Bayesian statistics, 7) permutation and distribution free methods, 7) mathematical modelling. All analyses are in R and emphasize the communication of data through the creation of figures and results. This self-paced course is designed to help students learn the statistics needed for research. This course is made up of multiple modules, each one can be taken for 1 credit (up to 3 per semester). For each module, the student is responsible for watching lecture videos on their own and working to complete assignments related to the topic material. These assignments can be done alone or in groups.

BIO_SC 8505, Plant Stress Biology

Spring 2024, Dr. David Mendoza-Cozatl. Life on Earth depends on plants and their ability to provide key resources to almost every ecosystem in the planet. Despite recent and significant advances in genetics and molecular biology, the mechanisms by which plants adapt to changing environments are still largely unknown. This course will cover different stresses (biotic and abiotic) that plants encounter everyday as well as their physiological and molecular responses to physiological environments. Understanding these response mechanisms is critical to develop more nutritious crops and eliminate food insecurity in a sustainable and responsible way.

GRADING AND CREDIT POLICIES FOR GRADUATE STUDENTS

The Graduate School Grading and Credit Policies website defines and details policies regarding satisfactory/unsatisfactory (S/U) grades, Unreported Grades (NR), Incompletes, Graduate-Level Courses, Grade Point Averages, GPA and Probation and GPA and Graduation for graduate students.

The Division considers grades of "A" and "B" as passing grades. Grades in the "C" range are considered unsatisfactory, and the student must retake the course(s). A required course must be completed with a grade of "B" or better in order to remain a Ph.D. student in good standing. No D grade may be awarded to a graduate student, and a grade of F means the work has not satisfied the minimum requirements of the course. A grade of "F" in required courses can result in dismissal from the graduate program in Biological Sciences, for lack of making "satisfactory progress". Only graduate students in good standing may take the Comprehensive Exam.

ANNUAL REVIEW OF GRADUATE STUDENT PERFORMANCE

The Division of Biological Sciences and the Graduate School both require all master's and doctoral students to submit an annual report of academic progress. Annual reviews take place during the Spring semester.

Progress Toward Degree

Full-time students should follow the timeframes associated with degree programs established by the Division of Biological Sciences. They must submit required forms on time and maintain a grade point average of 3.0 or better. Furthermore, they must successfully undergo their Divisions' annual review processes.

Division of Biological Sciences Annual Review

The progress of each graduate student is evaluated annually by the student's Primary Advisor and the Division's Director of Graduate Studies and Graduate Education Committee (GEC).

The Division's annual review of graduate students has two goals. First, it provides a mechanism to facilitate/promote communication between graduate students and their mentors about

progress, expectations, and academic and professional goals. Second, it ensures that students are on track to complete their degree in a timely manner and, if not, to identify/address any issues that may be hampering progress. Additionally, information from the annual reviews is used by the GEC to assess the overall graduate student experience in the Division and to identify areas in need of improvement.

As part of the annual evaluation, students are required to (1) complete a self-evaluation, (2) complete an evaluation of their Primary Advisor, (3) submit a current CV, (4) meet with the GEC. The student's Primary Advisor will also complete an evaluation of the student and a self-evaluation of their mentoring. Following the meeting, the GEC will provide a letter to the student and mentor with an assessment of the student's progress, next steps, and suggested areas for professional development and continuing progress. The student's and Advisor's responses to the evaluations will also be provided with the letter.

The GEC also uses information from the annual reviews to assess the overall graduate student experience in the Division and to identify any areas in need of improvement.

Graduate School Annual Review of Performance

The Graduate School coordinates its annual reviews for PhD students and graduate assistantships in myVITA. At a minimum, graduate students should report on their academic progress, completion of required forms, awards and honors, conferences, presentations, publications, service activities, creative activities, funding activities, employment, and job placement. Click here to Access myVITA.

Probation and Termination Policies for Graduate Students

In addition to dismissal for failure to meet the usual examination and grade requirements, departments and graduate-degree-granting area programs have the right to place on probation — and, after at least 30 days of probation, to dismiss from the program — any graduate student who is deemed to be making insufficient academic progress or whose work is not of the quality required. The faculty Advisor or academic program chair must inform the Graduate School as soon as the student has been notified and the probationary period has begun. The dismissal may occur at any time during a student's work toward a graduate degree.

See Academic and Departmental Probation, Termination, and Appeals and Probation & Termination Policies for Graduate Students on the Graduate School's website for complete information about the probation-termination-appeal process.

Process of Appeal of Dismissal to Division of Biological Sciences

A student may appeal dismissal from the Division of Biological Sciences graduate program to the Division's Graduate Education Committee. The student must inform the DGS in writing that they are appealing dismissal within two weeks of dismissal; this letter should also be sent to the Graduate Dean. No members of the GEC who are also on the student's committee may participate in the appeal decision. If a majority of the members of the GEC are also on the student's committee, an ad hoc committee will be appointed by the Director of the Division to

consider the appeal of dismissal. The student should submit to the GEC a written statement that documents how the student has met each of the conditions of probation described in the letter from his/her graduate committee.

Process of Appeal of Dismissal to the Graduate Faculty Senate

Students may appeal dismissal from a graduate degree program to the Graduate Faculty Senate. See Academic and Departmental Probation, Termination, and Appeals on the Graduate School's website for complete information about the process.

TEACHING EXPERIENCE

An important part of graduate education is learning to communicate effectively as a teacher. All students must participate in all the Teaching Assistant (TA) orientation and training offered by the Division of Biological Sciences (TA Orientation and BIO_SC 8002) and by MU (GATO).

Student TAs work in conjunction with a faculty who is instructor in an undergrad-level course. TA performance is evaluated by undergraduate students and by Dr. Gerald Summers, Associate Director of Instruction for the Division, who serves as the supervisor for all GTA positions. Visit https://gradschool.missouri.edu/policy/performance-renewal-evaluation-criteria-for-graduate-assistantships/ to read more about assistantship performance evaluations.

Oral Language Proficiency

Missouri requires that students whose first language is not English demonstrate adequate oral proficiency before they can assist in teaching. Proficiency is demonstrated by passing the University oral proficiency examination. The International Teaching Assistant Program (ITAP) provides an on-campus, computer-assisted assessment called the MACCS (Mizzou's Assessment of Classroom Communication Skills). Assessment results are given as a proficiency level from 1 to 4. A minimum level of 3 is needed to qualify for a teaching-related role in the Division of Biological Sciences. *Failure to pass the oral proficiency examination by the end of the first year following matriculation may result in termination from the graduate program.* Students with poor oral proficiency, as evidenced by a score of less than 1 or 2 on the exam, may be required to enroll in a University English course.

Campus Teaching Professional Development Opportunities on Campus

The GEC recommends the following resources for graduate students who are particularly interested in teaching as a career and wish to gain additional teaching experience.

- Minor in College Teaching
- Teaching for Learning Center
- Sandra Abell Conversations in College Science Teaching
- THRIVE
- Celebration of Teaching Annual Conference (takes place in May)
- UM System Teaching & Learning Support website

GRADUATE STUDENT RESOURCES

Best Practices

The GEC is committed to providing graduate students a positive and productive academic experience during their time in the Division. The committee encourages use of the mentorship tools recommended in *The Science of Effective Mentorship in* STEMM (a report and podcast from the National Academies of Science, Engineering, and Medicine; 2019). These practices promote effective, healthy mentorship relationships and experiences. Below are brief descriptions of these tools as well as links to resources for further information:

- **IDPs**, require mentees to think through their short- and long-term career plans and formulate a path to enact the plans with support from their mentor. The GEC recommends use of AAAS's myIDP, which is designed for scientists, and this article: Ben J. Vincent, Clarissa Scholes, Max V. Staller, Zeba Wunderlich, Javier Estrada, Jeehae Park, Meghan D.J. Bragdon, Francheska Lopez Rivera, Kelly M. Biette, Angela H. DePace (2015) Yearly Planning Meetings: Individualized Development Plans Aren't Just More Paperwork Molecular Cell, 58 (5): 718-721 https://doi.org/10.1016/j.molcel.2015.04.025
- Entering Mentoring, this curriculum focuses primarily on mentorship in research training environments, and its stated aim is to help mentors at all stages develop and refine their mentorship abilities.
- **Lab Values Statement**, a document (usually online) that outlines role-specific expectations for lab members, as well as guidelines for maintaining key lab values; practice for aligning mentor and mentee expectations; e.g. statements: King Lab in DBS, Hammond Lab at MIT, Puckett Lab at the University of Memphis
- **Mentoring Compacts**, "provide a structure for mentors to outline expectations from, and commitments to, mentees, and vice versa. Compacts differ from an IDP, which focuses on short- and long-term career plans, as they are focused on expectations for the working relationship on a daily, weekly, or monthly basis." (Source: *The Science of Effective Mentorship in* STEMM). For example Mentoring Compacts, see https://ictr.wisc.edu/mentoring/mentoring-compactscontracts-examples/

Professional Development

Students are strongly encouraged to seek professional development in areas that support their professional goals. The Graduate School offers many professional development opportunities, including courses, seminars, and gradEssentials workshops throughout the year.

Forms

The student is responsible for acquiring and filing the proper forms for submission to the Graduate School during the course of their program. Forms are forwarded through the Division's DGS to the Graduate School by the semester deadline. Current versions of these forms are available on the Graduate School website: https://gradschool.missouri.edu/current-students/forms-cs/

Required Forms for the M.A. Degree

- M1 – Program of Study for the Master's Degree
- M2 – Request for Thesis Committee*
- M3 – Report of the Master's Examining Committee
- M3A – Post-graduation Information (Division-specific form)

*The M2 form is not required for a non-thesis M.A. degree option. The non-thesis option is available only for students who transfer from the Ph.D. program to the M.A. program.

Required Forms for the Ph.D. Degree

- D1 – Qualifying Examination Results and Doctoral Committee Approval Form
- D2 – Plan of Study for the Doctoral Degree Form
- D3 – Doctoral Comprehensive Examination Results Form
- D4 – Report of the Dissertation Defense Form
- D4A – Post-graduation Information (Division-specific form)

Other Required DBS Forms

- Annual Report of Program Committee, this form is completed by the Primary Advisor after the student's annual meeting with their thesis/dissertation committee.

Other Commonly Used Forms

- Graduate Certificate Plan of Study
- Change of Committee Form
- Application for Graduate Change of Program, Degree, Emphasis or Advisor
- Plan of Study Substitution Form

Travel Grants

Division of Biological Sciences Travel Support Program provides partial support for graduate students to participate in a conference, do field research, or attend workshops or specialized training. Priority is given to doctoral candidates who have passed their comprehensive exam and have a demonstrated record of service to and engagement with the Division. Applicants are required to have matching support from their Advisor and also are strongly encouraged to seek matching support from other sources. Applications should be emailed to the Director of DBS by no later than one month prior to the activity for which funding is being requested. Click here for application.

Dr. Philip and Betty Jen Neuroscience Student Travel Award Fund are awarded to neuroscience graduate students in the Division of Biological Sciences (with or without affiliation with the Interdisciplinary Neuroscience Program). The award shall be used for student travel expenses to attend professional meetings and/or conferences. Support is limited to airfare or mileage and registration costs. Applications should be submitted to the Director of the Division of Biological Sciences no later than one month prior to the meeting. Click here for application.

Additional travel scholarships for graduate students are available from the Graduate School, the Graduate Professional Council, the Douglas D. Randall Young Scientists Development Fund, and the Trans-World Airlines Scholarship.

Graduate Student Awards

Ethel Sue Lumb Award is awarded to graduate students in the Division of Biological Sciences in recognition of scientific merit. Eligible graduate students must have recently completed their comprehensive exam and/or their coursework, be more than one year away from graduation, and demonstrate financial need by completing a FAFSA. Selected recipients will receive a framed certificate and a one-time $2,000 award added to their stipend.

Additional graduate student awards include the Dissertation Year Fellowship, Distinguished Thesis and Dissertation Award*, Donald K. Anderson Graduate Teaching Assistant Award*, Donald K. Anderson Graduate Research Assistant Award*, Sandra K. Abell Science Education Award, and the Mary Elizabeth Gutermuth Award for Community Engagement are available from Graduate School, as well as the J. Perry Gustafson Award for Outstanding Graduate Research in the Life Sciences from the Douglas D. Randall Young Scientists Development Fund.

*Division-nominated award – students who wish to be considered for this award should notify the DGS by November 30. Candidates will be asked to provide appropriate materials for the GEC to make a decision about who to nominate for the award.

Extracurricular Involvement

Involvement in the academic life of the Division and campus is an important part of the graduate education experience in the Division of Biological Sciences. Participation is considered when making decisions about nominations for Divisional/campus awards and Divisional travel grants.

Divisional Involvement

Graduate students are expected to regularly participate in the following divisional activities:

- DBS Seminar, held Thursdays from 3:30-4:30 in Tucker 111
- Graduate Student Seminar, held Tuesdays from 3:30-4:30 in Tucker 18
- Biology Graduate Student Association, meets monthly after Grad Seminar in Tucker 111; also has a Slack site
- Peer Mentoring (for incoming students)
- Annual Research Retreat, held during the Fall semester (September 15, 2023)
- Community Checkup Survey (conducted every Spring semester)
- Hooding ceremony for graduate students who have completed their degree (held in May)
- Graduate recruitment events
- Graduate welcoming events

The Division also offers opportunities for student participation on the following committees: Graduate Education Committee, Divisional Seminar Committee, Faculty Search Committee(s), Divisional Council (governing committee of the Division), Undergraduate Education Committee, and Diversity Committee. Students interested in participating on any of these committees should let the DGS or GEC know.

Campus and Community Involvement

The GEC recommends the following organizations for graduate students who wish to get involved in campus and community activities.

- Mizzou SACNAS Chapter
- Alternative Career Exploration in the Sciences (ACES)
- Science on Wheels
- Graduate Professional Council
- Latino/a Graduate & Professional Network
- Association of Black Graduate and Professional Students

Suggested Model Timeline for 2-Year M.A. Degree

YEAR 1	FALL	SPRING	SUMMER
Courses	**9 Credit Hours** BIO_SC 7990 BIO_SC 8050 BIO_SC 8087 BIO_SC 8187 Courses in research area	**9 Credit Hours** BIO_SC 7990 BIO_SC 8087 BIO_SC 8187 BIO_SC 8060 Courses in research area	**3 credit hours** BIO_SC 8090
Activities	• Grad School Orientations • Identify Primary Advisor	• Form Thesis Committee (M-1) • Complete Plan of Study (M-2) • Design thesis project • Present at Grad Seminar • Annual Evaluations	Thesis research
YEAR 2	**FALL**	**SPRING**	**SUMMER**
Courses	**9 Credit Hours** BIO_SC 8087 BIO_SC 8187 BIO_SC 8090 Courses in research area	**9 Credit Hours** BIO_SC 8087 BIO_SC 8187 BIO_SC 8090 Courses in research area	
	• Thesis research	• Apply for Graduation • Write and defend thesis • Submit M-3 form • Submit thesis and supplementary forms via Canvas	

Suggested Model Timeline for 5-Year Ph.D. Degree

YEAR 1	FALL	SPRING	SUMMER
Courses	**9 Credit Hours** BIO_SC 7990 BIO_SC 8050 BIO_SC 8087 BIO_SC 8187-1 Courses in research area	**9 Credit Hours** BIO_SC 7990 BIO_SC 8087 BIO_SC 8187-1 BIO_SC 8060 Courses in research area	**3 Credit Hours*** BIO_SC 9090
Activities	• Grad School Orientations • Lab Rotations (optional) • Identify Primary Advisor	• Form Doctoral Program Comm (DPC) • First Committee Mtg /Qualifying Exam • Complete Plan of Study • Submit D-1 and D-2 Forms • Present at Grad Seminar • Annual Evaluations	• Research

YEAR 2	FALL	SPRING	SUMMER
Courses	**9 Credit Hours** BIO_SC 8087 BIO_SC 8187-1 Courses in research area	**9 Credit Hours** BIO_SC 8087 BIO_SC 8187-1 Courses in research area	**3 credit hours*** BIO_SC 9090
Activities	• Research	• Committee Mtg/Comp Exam • Submit D-3 Form • Research • Annual Evaluations	• Research

YEAR 3	FALL	SPRING	SUMMER
Courses	**9 credit hours** BIO_SC 8087 BIO_SC 8187-1 BIO_SC 9090	**9 credit hours** BIO_SC 8087 BIO_SC 8187-1 BIO_SC 9090	**3 credit hour** BIO_SC 9090
Activities	• Research • Present at Grad Seminar	• Meet with Committee • Research • Annual Evaluations	• Research

YEAR 4	FALL	SPRING	SUMMER
Courses	**2 credit hours** BIO_SC 8087 BIO_SC 9090	**2 credit hours** BIO_SC 8087 BIO_SC 9090	**1 credit hour** BIO_SC 9090
Activities	• Research • Apply for postdoc fellowships	• Research • Meet with Committee • Present at Grad Seminar • Annual Evaluations	• Research • Interview for postdocs

YEAR 5	FALL	SPRING	SUMMER
Courses	**2 credit hours** BIO_SC 8087 BIO_SC 9090	**2 credit hours** BIO_SC 8087 BIO_SC 9090	
Activities	• Wrap-up research • Meet with Committee	• Apply for Graduation • Write and defend dissertation • Submit D-4 and D-4A Forms • Submit dissertation and supplementary forms via Canvas	