MISSOURI S&T

Department of Biological Sciences Graduate Student Handbook

This document was last revised Spring 2026.

The Department of Biological Sciences offers thesis and non-thesis M.S. in Biology and a Ph.D with emphasis areas in Biomedicine, Innovations in Biology or Environmental Biology. A graduate degree in Biological Sciences allows students to enhance their career marketability and expand their ability to deeply examine and contribute knowledge to the natural world. As part of a science and technology university, our program has the unique advantage of being part of a rich history of scientific application that includes patent development, deep connections with the leading scientific and technological industries, and innovative solutions to challenging global problems.

The graduate degrees offer students an opportunity to conduct original research, refine experimental and analytical skills, and increase their depth of knowledge. With research strengths in cellular and molecular biology, ecology, and translational research, the Department offers a breadth of opportunity for students seeking to expand their horizons through further educational opportunities.

Graduate students in the Department work closely with faculty advisors and other students to design, execute, and interpret experiments that answer basic and applied scientific questions. We encourage interdisciplinary and transdisciplinary collaborations, external partnerships, and participation in regional and national conferences. Competitively awarded graduate research and teaching assistantships are available for excellent applicants with an identified faculty mentor.

Program Objectives

Program objectives for the Masters degree program are the development of deep subject knowledge, critical thinking, research skills (design, data analysis, literature review) and effective scientific communication (oral/written) to prepare these graduates for further Ph.D. studies, research roles in industry/government, health professions, or education.

Program objectives for the Ph.D. program are the development of independent, creative scientists who will conduct original research, master advanced techniques, and effective communicators. Students in this program will develop skills in formulating novel research questions, design experiments, analyze data, and integrate new knowledge into scientific frameworks. These graduate students will be prepared for careers in academia, government research, industry innovation (biotech, health, and agriculture), and science communication/policy.

Equipment and Facilities

In the Department of Biological Sciences, we have access to and utilize an array of cutting-edge technologies for microscopy, genetic analyses, cytology, molecular biology, and microbiology. Our environmental and ecological students utilize the outdoor laboratory at the Missouri S&T Ozark Research Field Station, abundant local natural resources, and our connections with federal and state land management agencies to answer questions related to environmental physiology, hydrological flow, evolutionary origins, and ecological function. The 1,780 square foot Missouri S&T Animal Research Facility houses research animals, colony rooms, and a surgical theater for experimental research in physiology, anatomy, behavior, and medical applications. Departmental offices and laboratories are housed in Schrenk Hall.

Admissions & Qualifications of Prospective Students

Students seeking admission to the graduate degree program in Biological Sciences will be required to meet the standard admissions requirements as defined in the Missouri S&T Graduate Catalog. We recommend that applicants to our program have a minimum of 30 semester hours of biological course work and a cumulative undergraduate GPA >3.0/4.0. We require GRE scores of >300 Quantitative + Verbal, and >3 Analytical Writing or an MCAT score of 500 or above. If a student's preparation for formal graduate study is judged to be inadequate, a program of prerequisite course work will be outlined for the purpose of properly supplementing their preparation. Such courses will not be credited as course requirements for the degree.
In addition, we require a minimum TOEFL score of 80 (iBT) from international applicants from countries where English is not a national language. International students should familiarize themselves with Missouri S&T's policies and procedures with regard to residency, academic requirements, training, visa status, and regulations. With their applications, interested students should also include a personal statement outlining their research interests; a curriculum vitae or resume; three reference letters; and an official transcript. Furthermore, for students wishing to pursue a thesis M.S. or Ph.D., it is required that a letter is obtained from a current departmental faculty member indicating that they agree to serve as your degree advisor and provide evidence of support (funding for stipend, tuition, resources to conduct the thesis or Ph.D. research).

Curriculum & Degree Requirements

Graduate study in Biological Sciences is characterized by close interactions with productive faculty members. Courses of study are individualized and will include seminars and specialized courses in multiple disciplines. Emphasis is placed on research efficiency and communication skills. With guidance from the advisor and their graduate advisory committee, each candidate will complete a plan of study to satisfy interests of the candidate, advisor, and degree program.

Responsibilities of Your Graduate Advisor

Your advisor is an active participant in directing your coursework and research project. It is of the utmost importance that a good channel of communication be open between the advisor and the student. All problems and questions should be brought to the attention of the advisor first before seeking assistance elsewhere. Graduate advisors are expected to:
1. Meet regularly with graduate students to review and support academic and research progress
2. Discuss overall program of study and course requirements with graduate students and assist with course selection
3. Clearly communicate expectations regarding research projects, timetable, publications, etc.
4. Help graduate students choose an appropriate advisory committee
5. Introduce students to laboratory procedures, policies and expectations
6. Assist with experimental protocol, data analysis, scientific writing, and seminar preparation
7. Provide constructive and timely feedback on proposals, manuscripts, posters, presentations, etc.
8. Ensure that students are provided with necessary training, and have access to research equipment, facilities and resources
9. Ensure that the Graduate Learning Outcomes (GLO) forms are completed by all members of the Dissertation Committee after each meeting, and that the forms are submitted to the Department of Biological Sciences for record keeping

Additional Responsibilities of Graduate Students

1. Regularly update your graduate advisor and graduate advisory committee on the status and progress of your research and goals
2. Complete required courses maintaining a GPA > 3.0
3. Complete your research and collaborate with your advisor to submit manuscripts for publication
4. Maintain clean, safe laboratory and work environment
5. Complete required training in a timely manner
6. Attend departmental seminars and other relevant academic events
7. Provide all requested documentation to your advisor and Graduate Coordinator in a timely manner
8. Respond promptly and professionally to correspondence from faculty

Financial Assistantships

Financial assistantship may be available to excellent students. The department offers graduate teaching assistantships (GTAs) and graduate research assistantships (GRAs). GTAs are responsible for instructing, preparing, and maintain teaching laboratory assignments for approximately 20 hours per week in conjunction with a professor assigned to the course. GRAs are expected to work on faculty research and provide additional laboratory support to accomplish funded project objectives. Additional funding for research and travel may be available. Students are encouraged to pursue these opportunities as they arise. More information can be found under "Financial Assistance" in the Graduate Catalog.

GTA and GRA funding include tuition waivers and living stipends and are competitive relative to area cost of living. Funding is contingent on maintenance of high standards of professional integrity, excellent academic performance, satisfactory teaching evaluations, and satisfactory progress toward completion of your degree. GTA funding is renewable for up to four semesters for thesis MS students and ten semesters for PhD students. These semesters do not have to be consecutive if other support is utilized. Funding decisions are made on a semester-by-semester basis and not guaranteed. Students who are funded by these models will meet at the end of each semester with the Graduate Program Coordinator to review performance.

GTA support is contingent on successful completion of the GTA workshop upon arrival on campus: The GTA workshop provides students with the opportunity to learn classroom techniques and create classroom presentations. Failure to complete this workshop will result in prohibition from classroom instruction and will result in revocation of GTA funding. International student applicants from countries where English is not a national or primary language are also required to pass a SPEAK English language test to secure GTA funding.

Conflicts with Graduate Advisors

Consistent and constructive communications between graduate student and advisor usually yield the most productive outcome. However, conflicts do occur: Both graduate students and advisors should try to understand the root of the conflicts and find a solution. Students who are unable to resolve conflicts with advisors should contact the Biological Sciences Graduate Program Coordinator (Chair of the Department's Graduate Committee), or in the event of a conflict of interest, the Department of Biological Sciences Chairperson.

Harassment & Discrimination

The Department of Biological Sciences is committed to an inclusive, equitable and supportive environment for all members of our community. Diverse scholars and students immeasurably enrich our teaching, learning, scholarship, research and creativity. We strive to create a climate whre every individual feels welcomed, respected, and empowered to contribute. We value the knowledge and cultural perspectives that students, staff, faculty and visitors bring, and we actively work to ensure that these voices are represented and heard within our classrooms, laboratories and field station. Harassment of any kind is contrary to our core values and will not be tolerated. We strictly prohibit any unwelcome, hostile, or offensive behavior based on age, race, color, religion, national origin, ancestry, sex, sexual orientation, gender identity, disability, or any other protected characteristic. This commitment applies at every level of our department and within all of our programs and activities. We encourage all members of our community to speak up when they witness or experience condut that undermines these values. If a student encounters harassment, misconduct, assault, or discrimination based on race, color, religion, age, national origin, ancestry, sex, sexual orientation, gender identity or disability, the student should contact the Title IX Coordinator or other designated campus resources for support and reporting options. Together, we are responsible for building a community that reflects integrity, compassion and respect.

More information on the Equity and Title IX here.You can also file a report in person at 203 Centennial Hall, 300 West 12th Street, Rolla, Missouri 65409, or by phone at 573-341-7734 during business hours (8:00 – 4:30 p.m.).

Academic Integrity

Academic integrity is essential to the pursuit of knowledge and the reputation of our scholarly community. Upholding integrity protects both your own academic and professional future, and the value of the degrees we confer. We expect all students at all times to demonstrate the highest standards of honesty, responsibility, and ethical behavior in their work. It is each student's responsibility to understand what constitutes plagiarism and other forms of academic misconduct. Lack of awareness does not excuse a violation. If you have any doubts about proper practices, seek clarification before submitting work. Student resources for academic integrity are detailed here. Graduate student-specific resources on plagiarism can be found here.The student's advisor or the Graduate Coordinator can also help find additional resources. By committing to these principles, we ensure a fair, respectful, and trustworthy academic enviorinment where everyone can succeed.

Master of Science in Biology with Thesis

The M.S. program with thesis consists of a minimum of 30 semester hours of graduate credit over and above the prerequisites for admission. Up to 6 credit hours may be taken at the 3000-level in courses offered by other departments. A minimum grade of B is required for all courses used to fulfill the M.S. degree requirements.

Timeline for Mandatory Milestones

Milestone	Timeline
Declaration of Thesis Advisor & Thesis Committee	Established by the end of the semester that the student will have completed nine hours of graduate credit or at the end of the first semester, whichever occurs later
Plan of Study (Form 1)	Form 1 must be submitted during the semester the student will have completed nine hours of graduate credit or at the end of the first semester, whichever occurs later
First-year committee meeting – thesis research proposal	First committee meeting should be completed in the student's second semester of program
Present Departmental Seminar describing proposed thesis research	Presented during second semester of graduate program
Department informed of thesis defense.	Student notifies Biology Department Administrative Assistant at least one week prior to defense so announcements can be sent to all members of the Department.
Distribution of thesis for review by the thesis committee	A minimum of seven days prior to defense
Successfully pass thesis defense	Submit Form 2 and final copy of thesis

The following courses are required:

BIO SCI 6202 Problems in Applied and Environmental Biology (3.0 LEC)
BIO SCI 5020 Data Analysis and Presentation (1.0 LEC)
BIO SCI 6223 Research Proposal Writing (3.0 LEC)
BIO SCI 5099 Graduate Research (6.0 RES)

A minimum of 24 credit hours of 4000-, 5000-, and 6000-level lecture courses must be included in the final degree, inclusive of those listed above. A minimum of nine of those credit hours must come from 6000-level lecture courses.

Selection of Thesis Advisor: All thesis students must select a thesis advisor before admission into the Master's program. The thesis advisor must be a Missouri S&T graduate faculty member of the Department of Biological Sciences. The Graduate Coordinator must be notified by the student of any change in thesis advisor. (See section on Conflicts with Graduate Advisors.)

Selection of Thesis Committee: Students must select a Thesis Committee in consultation with their thesis advisor, by the end of the semester that the student will have completed nine hours of graduate credit or at the end of the first semester, whichever occurs later. The thesis committee and planned coursework will be recorded on Form 1and submitted to the Office of Graduate Education. The Thesis Committee will consist of the student's thesis advisor plus at least two additional members of the Missouri S&T graduate faculty with a majority of faculty from the Department of Biological Sciences. The Thesis Committee will review and approve the student's course requirements and research program. The Thesis Committee will also review the student's thesis and participate during the student's final thesis defense.

Research Proposal: Students completing a Master's Degree with thesis are required to present their draft research proposal in the departmental seminar series in their second semester of enrollment. The student and their committee members should meet in close proximity to this time to advise the student on their research plans. The chair of the student's committee is responsible for ensuring that the Graduate Learning Outcomes (GLO) forms are completed by all members of the committee and will submit these forms to the Department of Biological Sciences' Office for record keeping.

Thesis Preparation: The findings and results of research undertaken by the candidate for a master's degree must be presented in a thesis. A manual entitled "Regulations and Specifications for Thesis and Dissertations (T/D)" can be found on the Graduate Education webpage. The student will distribute copies (digital or hardcopy) of the thesis to the examining committee and arrange a time and place for the oral defense of the thesis. The student must be enrolled at the time of the examination in accordance with Missouri S&T Policy Memorandum II-20. Each committee member should be allowed to examine the thesis for at least seven days before the oral defense.

Thesis Defense: When the date for the thesis defense has been finalized, the student will send an email notice to the departmental administrative assistant containing the thesis defense date, time and location for posting to the Faculty and Graduate Students mailing lists for the Department of Biological Sciences. The thesis defense date will be announced no fewer than seven days prior to the scheduled date of the defense.

The defense may be comprehensive in scope and the candidate should exhibit an acceptable knowledge of a professional area as defined by the program. In order for the candidate to pass the examination, all the examining committee must vote affirmatively. If any member of the committee votes not to pass the candidate, the committee will administer a second examination. A student who fails a second time will no longer be eligible for a master's degree from Missouri S&T. Immediately following the thesis defense, the student will submit a Graduate Form 2 to the Office of Graduate Education. Deadlines for Form 2 will be announced prior to the beginning of each semester and can be found on the Office of Graduate Education webpage. The approved copy of the thesis, including any corrections indicated by the examining committee should be submitted to the Office of Graduate Education according to the directions provided to the student by this office. The chair of the student's thesis committee is responsible for ensuring that the Graduate Learning Outcomes (GLO) forms are completed by all members of the committee and will submit these forms to the Department of Biological Sciences Office for record keeping.

Master of Science in Biology without Thesis

This program consists of a minimum of 30 coursework hours. Up to 6 credit hours may be taken at the 3000-level in courses offered by other departments. A minimum of 24 credit hours of 4000-, 5000-, and 6000-level lecture courses must be included. A minimum of 9 of those hours must come from 6000-level lecture courses. No credit hours of graduate research may be applied toward the plan of study.

If an student is an undergraduate in the S&T Bachelor of Science (B.S.) program or other related programs such as Environmental Science, they may take advantage of the Grad Track Pathway. Prior to completing the B.S. degree, a student can take up to nine credit hours of graduate level courses (5000- and 6000-level lecture courses) that can be applied towards both their B.S. and Master's degree. Typically, students who participate in this program pursue the non-thesis Master's degree. It is also possible to enter the GTP program as a thesis student. However, even with undergraduate research experience, it is likely that the completion of this degree will be more than two semesters post undergraduate graduation.

Timeline of Mandatory Milestones

Milestone	**Timeline**
Declaration of Graduate Advisor	Established by the end of the semester that the student will have completed nine hours of graduate credit.
Plan of Study (Form 1)	Form 1 must be submitted during the semester the student will have completed nine hours of graduate credit.

There are two courses are required for all non-thesis Master's degree students:
BIO SCI 6202 Problems in Applied and Environmental Biology (3.0 LEC)
BIO SCI 5020 Data Analysis and Presentation (1.0 LEC)

Selection of Advisor: Students should select and meet with an advisor (typically the graduate coordinator of the department), determine a program of study and complete Graduate Form 1 in the first semester of enrollment. Each semester, the student must follow the program of study on Form 1 exactly or must submit Form 1A indicating changes to the program of study to the Office of Graduate Education.

Master of Science in Biology without Thesis for Teachers - Emphasis in STEM Education and Leadership

All courses will be taught either asynchronously online or in person with a synchronously online option to accommodate distance students. Students who complete the MS program will also receive a Graduate Certificate in Teacher Leadership.

The Non-thesis MS in Biology for Teachers with Emphasis in STEM Education and Leadership has additional admission requirements:

- Currently teaching high school biology, have earned an Education degree, or have current teacher certification
- No GRE is required
- Statement of purpose should address how the program will impact their teaching and learning community

Four prescribed education courses that lead to a *Graduate Certificate in Teacher Leadership* are required and will be delivered by Missouri S&T's Department of Education (12 hours).

Transfer from Thesis to Non-Thesis Program

A thesis student may transfer to the non-thesis program at the end of a semester. Students who transfer into a non-thesis program relinquish financial assistance through GTA or GRA support. The thesis advisor, thesis committee, and Graduate Coordinator should be notified of this transfer in writing. Students who are admitted to the non-thesis program cannot transfer to a thesis program without a majority vote by the Graduate Committee and an endorsement from a prospective thesis advisor.

Ph.D. in Biological Sciences

The goal for our doctoral program is to train leaders and experts in biological sciences pursuing a variety of paths leading to careers in industry, governmental research, public policy and regulation, and academia. A focus on interdisciplinary training will be central to this goal. The doctoral program is divided into three tracks, Biomedicine, Environmental Biology, and Innovations in Biology, that reflect the breadth of our programs. Student internships are encouraged for students who want to establish industry, agency, or national lab connections while completing their degree.

Timeline for Mandatory Milestones

Milestone	**Timeline**
Declaration of Graduate Advisor & Dissertation Committee	Established by sixth week of second semester
Qualifier Examination	Must be passed no later than the end of the fifth semester enrolled as a doctoral student.
Plan of Study (Form 5)	Form 5 must be submitted by the end of the semester the student passes their qualifying exam.
Comprehensive Exam	Expected to be completed by the end of 3rd year. After a Ph.D. candidate has completed 50% of their doctoral degree coursework, they must pass their comprehensive exam. Form 6 is submitted
Present Full Departmental Seminar	At least one semester before defense.
Department and Office of Graduate Education informed of final doctoral defense.	Final Doctoral Defense Notification Form is submitted at least ten days before defense.
Distribution of dissertation for review	A minimum of seven days prior to defense
Successfully pass dissertation defense	Submit Form 7 and final copy of dissertation

Selection of Graduate Advisor and Dissertation Committee: Students must select a Graduate Advisor and establish a five-member Dissertation Committee by the 6th week of the student's second semester. The graduate advisor should not only help direct the student's research efforts but should also serve as the student's advocate. The committee must include at least one member from outside of the Department of Biological Sciences with the majority of membership from within the department. The purpose of the dissertation committee is to ensure that standards and guidelines are followed and to provide mentoring, technical expertise, and guidance to aid the student's progress. The committte provides accountability for both the student and the graduate advisor. The committee is selected by the graduate student in consultation with their advisor.

The Graduate Coordinator must be notified by the student of any change in a student's Graduate Advisor. (See section on Conflicts with Graduate Advisors.)

Qualifier Examination: The purpose of the qualifying exam is to demonstrate the student's competency and commitment to their pursuit of a Ph.D. If a student successfully completes and passes the coursework they have taken their first four semesters, they will have achieve the intent of the qualifying exam and have passed the examination. This should be done prior to the end of the student's second year of study. After the student successfully passes their course work during their first four semesters, the student must submit Form 5 detailing the rest of their expected course of study through the Graduate Education Office.

Routine Meetings with Student's Dissertation Committee: The graduate student must meet with the student's Dissertation Committee on an annual basis starting no later than the fourth semester of their Ph.D. program. Regular annual meetings will be held each year until completion and defense of the student's dissertation. The students are required to schedule their annual meeting in coordination with their Dissertation Committee.

During these meetings, the Dissertation Committee should review progress in coursework and research and complete an annual Graduate Learning Outcomes (GLO) form. This form should be signed and returned to the department office for a student to remain in good standing. The Departmental Graduate Committee will monitor students' progress through these annual committee meeting forms.

If a student plans to schedule their comprehensive examination, the comprehensive/defense examination meeting can substitute for the annual committee meeting within that academic year at the discretion of the Dissertation Committee.

Required Coursework: Students who hold a M.S. degree shall be required to complete a minimum of 42 hours of graduate credit. The plan of study must include a minimum of 12 credit hours of 4000-, 5000-, and 6000-level courses. It is recommended that 9 credit hours come from 6000-level courses. Additionally, a minimum of 24 hours of graduate research is required.

Students who do not hold a M.S. degree are required to complete a minimum of 72 hours of graduate credit. The plan of study must include a minimum of 30 credit hours of 4000-, 5000-, and 6000-level lecture courses. It is recommended that 15 credit hours come from 6000-level courses. Additionally, a minimum of 30 hours of graduate research is required. The remaining 12 credit hours can be applied to optional Graduate Certificates, used as to fulfill additional graduate research hours, or take other courses that are of interest to the student.

Development of Degree Plan of Study: The Ph.D. program in Biological Sciences is divided into three doctoral degree tracks,: 1) Innovations in Biology, 2) Biomedicine, or 3) Environmental Biology. Each track includes one required course, two elective content area courses, and a proposal writing course. Additionally, all students enroll in graduate seminar (Bio Sci 5020) at least twice (one credit hour each), and graduate journal discussion (Bio Sci 6202) at least once (two credit hours each).

Data Analytical Competency: All students in the Biological Sciences Ph.D. program will complete a minimum of six hours of data analytic competency courses. Options include any

graduate courses in statistics, graduate computer programming, database management, machine-learning, or artificial intelligence courses (4000-, 5000-, and 6000-level).

Professional Development: Graduate students who are interested in industry or national lab career paths will be strongly encouraged to cultivate industry or national lab connections and to perform an industry- or national lab-supported internship prior to graduation.

Optional Graduate Certificate: All students will have the option to earn a graduate certificate in a field of their choosing. Alternatively, students may develop a program of study that includes an equivalent amount of coursework in a focused area if a certificate is not available that meets the student's needs. Such a plan requires approval of the student's Graduate Dissertation Committee.

Comprehensive Examination: Students must pass a comprehensive examination to the satisfaction of the student's Dissertation Committee. The comprehensive exam will comprise of submission of a written synopsis by the student describing their current research project and future directions and an oral presentation to the committee focusing on the same. At least 80% of the student's committee must agree that the student successfully passed the exam. The comprehensive examination must be completed by the end of the third year of graduate study.

Preparation of Dissertation: Students must conduct original research, write a dissertation, and provide satisfactory defense of this work in a final oral examination. The Ph.D. dissertation will be considered by the student's Dissertation Committee with the scheduling of the student's final oral examination preferably after at least two peer-reviewed papers have been published or accepted for publication in refereed journal(s) and one regional or national conference presentation has been given by the student. Patents (filed or issued) will not be counted toward fulfilling the minimum publication requirement. It should be noted that the pursuit of intellectual property and patents is encouraged. If patents are filed, peer-reviewed publications based on this work are expected to be developed.

The peer reviewed publications counted towards the minimum requirement should comprise a major part/chapter(s) of the student's dissertation. Submitted manuscripts, manuscripts in preparation, or manuscripts under review should also be included in the dissertation. Dissertation formatting options are available here.

Biological Sciences Ph.D. Graduate Track Requirements

Innovations in Biology Track – Train students to design and develop biologically-related or biotechnological products geared for the marketplace.

Required Courses:

Advanced Principles of Biodesign (BIO SCI 6XXX)
Research Proposal Writing (BIO SCI 6223)

Elective Courses (choose two from these recommendations or other closely related courses):

Molecular Genetics (BIO SCI 4323)
Nanobiotechnology (BIO SCI 4666)
Bioinformatics (BIO SCI 5323)
Biomaterials II (MSE 6210)

Advanced Tissue Engineering (MSE 6240)
Advanced Stem Cell Biology (BIO SCI 6373)
Advanced Toxicology (BIO SCI 6383)
Bioremediation (BIO SCI 6463)
Advanced Genomics (BIO SCI 6433)
Advanced Microbial Metabolism (BIO SCI 6513)

Biomedicine Track – Train students to investigate and explore the processes that govern human health, development, and pathologies.

Required Courses:

Current Topics in Biomedical Sciences (BIO SCI 6XXX)
Research Proposal Writing (BIO SCI 6223)

Elective Courses (choose two from these recommendations or other closely related courses):

Advanced Tissue Engineering (MSE 6240)
Biomaterials II (MSE 6210)
Pathogenic Microbiology (BIO SCI 5313)
Biology of Aging (BIO SCI 5343)
Developmental Biology (BIO SCI 5353)
Pharmacology (BIO SCI 5533)
Bioinformatics (BIO SCI 5323)
Virology (BIO SCI 5493)
Advanced Cancer Cell Biology (BIO SCI 6353)
Advanced Stem Cell Biology (BIO SCI 6373)
Advanced Biomolecules (BIO SCI 6523)
Advanced Toxicology (BIO SCI 6363)
Advanced Genomics (BIO SCI 6433)
Advanced Biomolecules (BIO SCI 6523)
Advanced Neurobiology (BIO SCI 6533)
Advanced Nanotechnology in Biomedicine (BIO SCI 6666)

Environmental Biology Track – Train students to understand the complex interrelationships between living organisms and their physical and biological environments and to address complex biological questions that require the comprehension of multiple disciplines.

Required Courses:

Current Topics in Environmental Biology (BIO SCI 6XXX)
Research Proposal Writing (BIO SCI 6223)

Elective Courses (choose two from these recommendations or other closely related courses):

Advanced Global Ecology (BIO SCI 6563)
Advanced Biodiversity (BIO SCI 5423)
Environmental Microbiology (BIO SCI 6313)
Advanced Freshwater Ecology (BIO SCI 6363)
Population and Conservation Genetics (BIO SCI 5443)
Advanced Toxicology (BIO SCI 6383)
Geomicrobiology (BIO SCI 6343)
Bioremediation (BIO SCI 6463)

Non-Biological Sciences Graduate Certificates (optional, list is not inclusive):

Big Data Management and Analytics (COMP SCI)
Professional Communication (TECH COM)
Entrepreneurship and Technological Innovation (BUS)
Life Science Innovation and Entrepreneurship (Mizzou, online)
Health Ethics (Mizzou, online)
Informatics for Public Health (Mizzou, online)
Public Engagement (Mizzou, online)

Data Analytical Competency Courses (options available, can change):

Statistical Data Analysis Using SAS (STAT 5260)
Regression Analysis (STAT 5346) / Regression Analysis (COMP SCI 5204) (co-listed)
Statistical Data Analysis (STAT 5353)
Probability and Statistics (STAT 5643)
Design and Analysis of Experiments (STAT 6344)
Multivariate Statistical Methods (STAT 6545)
Evolutionary Computing (COMP SCI 5401)
Introduction to Data Mining (COMP SCI 5402)

Industry, Agency, or National Lab Paid Internship (optional):

BIO SCI 6085 Internship

Departmental Graduate Faculty

Gina L. C. Yosten, Ph.D., Professor and Kummer Endowed Chair of the Department of Biological Sciences
Research Interests: The roles of G protein-coupled receptors (GPCRs), in particular orphan GPCRs, in metabolic diseases such as type 1 diabetes and Prader Willi Syndrome.
Gina.Yosten@mst.edu

David D. Duvernell, Ph.D., Professor and Co-Director of the Ozark Research Field Station
Research Interests: Environmental DNA, population and conservation genetics, ichthyology, evolutionary ecology
duvernelld@mst.edu

Yue-Wern Huang, Ph.D., Professor, Associate Dean for Research and External Relations, and Director of the Center for BioMedical Research
Research Interests: Develop a system with nanomaterials and cell penetrating peptides (CPPs) to deliver biologically active molecules in vitro and in vivo for basic science research and biomedical applications relevant to disease treatment; Discover physical and chemical properties of nanomaterials that govern molecular mechanisms of nanotoxicity; Endocrine modulation in the environment
huangy@mst.edu

Grant Kolar, M.D., Ph.D., Research Professor and Chair of the Institutional Animal Care and Use Committee
Research Interests: Human metabolic disease, Spatial-transcriptomics, Spatial-proteomics
Grant.Kolar@mst.edu

Melanie R. Mormile, Ph.D., Professor, Graduate Coordinator, and Clare Boothe Luce Professor
Research Interests: Anaerobic microorganisms, Biodegradation of organic chemicals, Extremophiles in saline environments, Study of the fundamental physiology and potential industrial applications of extremophiles
mmormile@mst.edu

Dev. K. Niyogi, Ph.D., Professor
Research Interests: Effects of humanity on stream ecosystems, Role of biodiversity in controlling ecosystem processes, Nutrient uptake in streams and other aquatic systems
niyogid@mst.edu

Stephen P. Roberts, Ph.D., Professor, and Vice Chancellor and Chief Strategy Officer
Research Interests: Biomechanics and energetics of insect flight, Mechanisms of stress tolerance, Role of behavior and environment in aging and senescence
stephen.roberts@mst.edu

Andrea Scharf, Ph.D., Assistant Professor
Research Interests: Impact of life-history traits on populations dynamics and pollution-induced premature aging
scharfa@mst.edu

Julie Semon, Ph.D., Associate Professor
Research Interests: Identifying differences between sources of adult stem/progenitor cells, Regulation of stem/progenitor cell niche, Trafficking and fate determination of stem/progenitor cells
semonja@mst.edu

Katie B. Shannon, Ph.D., Teaching Professor
Research Interests: Temporal and spatial control of cell division, Budding yeast as a model to determine how cytokinesis is cell-cycle regulated.
shannonk@mst.edu

Katherine Sharp, Ph.D., Assistant Professor
Research Interests: Science and Biology Education
ksharp@mst.edu

Matthew S. Thimgan, Ph.D., Associate Professor; co-Graduate Coordinator
Research Interests: Using genetics in the model organism, *Drosophila melanogaster*, to understand the link between lipid metabolism and sleep regulatory pathways; Understanding why sleep deprivation has adverse consequences and how we might minimize these effects, Genetic mutant screens to identify novel genes involved in insomnia.
thimgan@mst.edu

Robin M. Verble, Ph.D., Professor; Director of the B.S. Environmental Sciences Program and co-Director of the Ozark Research Field Station
Research Interests: Fire ecology, insect ecology, wildland firefighter health
verbler@mst.edu

David J. Westenberg, Ph.D., Professor and Curators Distinguished Teaching Professor
Research Interests: Rhizosphere microbiology, Bioenergetics of symbiotic nitrogen fixation, Cell-cell communication in plant-microbe interactions, Microbiology education
djwesten@mst.edu

Affiliate Graduate Faculty

Chang-Soo Kim, Ph.D., Professor of Electrical and Computer Engineering
Research Interests: Solid-state microdevice engineering, Biomedical and biological sensors
ckim@mst.edu

Francisca Oboh-Ikuenobe, Ph.D., Professor of Geological Sciences
Research Interests: Organic-walled microfossils (Palynology) as tools for biostratigraphy, paleoclimates and paleoenvironments, Sedimentology and sequence stratigraphy
ikuenobe@mst.edu

Pablo Sobrado, Ph.D., Professor, Vitek/FCR Endowed Chair of Biochemistry
Research Interests: Enzymology, Analytical Biochemistry, and Drug Discovery
psobrado@mst.edu

List of Forms

All forms, except the Graduate Learning Outcome forms, performance reviews, and progress report, can be found on the Graduate Education webpage. *These forms are to be initiated by the student once a milestone has been achieved. Make sure that your major professor and members of your advisory committee are aware at the time of submission that you have filled out the form for each milestone.*

For Students in the Master's Degree Program

Form 1/1A—Program of Study – submitted prior to the end of the first semester of enrollment, details the list of courses that the student plans to take, can be resubmitted (as Form 1A) when the course list changes.

Form 2—Thesis Approval and Report on Examination for Master's Degree – reports the outcome of the thesis defense, is submitted after the completion of the thesis defense, is utilized by thesis students only, should be submitted concurrently with Graduate Learning Outcome (GLO) Standard Campus Rubric.

For Students in the Ph.D. Program

Form 4—Report on Qualifying Examination – required to report the results of the doctoral qualifying examination. The qualifying examination must be passed no later than the end of the fifth semester of enrollment. Enrollment on the date of examination is required.

Form 5—Plan of Study and Form 5A: Revised Plan of Study – this form is required to establish a plan of study and the committee for the student's doctoral degree program. This form must be submitted by the end of the semester in which the student passed their qualifying examination. Changes to plan of study can be made by submitting a Form 5A.

Form 6—Report on Doctoral Comprehensive Examination – required to report results of the doctoral comprehensive examination. After the candidate has completed at least 50% of the coursework required for the doctoral degree, as listed on their approved plan of study, the advisory committee must administer the comprehensive examination. Enrollment on the date of examination is required. A candidate will be considered to have passed the examination if all, or all but one, of the advisory committee members recommend that the candidate pass.

Final Doctoral Defense Notification Form – required to notify the department and the Graduate Education Office of the details of the student's final doctoral defense. When the dissertation is completed, the candidate arranges a date, time and location for the final defense of the dissertation and distributes a copy to each member of their advisory committee at least seven days prior. The defense should be scheduled only during days the university is conducting normal business operations, enrollment on the date of the examination is required and there must be at least twelve weeks between passing the comprehensive examination and holding the defense. Details of the defense, along with the dissertation title and abstract, must be publicized by Graduate Education at least one week prior to the defense.

Form 7—Report on Final Examination (Defense) and Dissertation Approval – required to report on the results of the doctoral final defense. A candidate will be considered to have passed the defense if all, or all but one, of the advisory committee members recommend that the candidate pass. Once this form has been approved by the advisor, committee, and department chair (or designee), no other content changes can be made except for changes to the format outlined by the dissertation specifications.

Forms Pertaining to All Biology Graduate Students

Graduate Learning Outcome (GLO) Standard Campus Rubric—submitted by each member of your committee twice in the course of the degree; at the end of the first committee meeting and during the last semester of your graduate program. This form is used to evaluate the student's knowledge, communication, critical thinking, and professional development. This form can be obtained in the Biological Sciences main office from the Administrative Assistant.

Graduate Research Assistant Performance Evaluation—this form is submitted during every semester a student is funded through a Graduate Research Assistantship. It is completed by the thesis advisor or laboratory supervisor in which the student is conducting funded work

Graduate Teaching Assistant Performance Evaluation—this form is submitted during every semester a student is funded through a Graduate Teaching Assistantship. It is completed by the instructor of record for the course in which the GTA is serving as a secondary instructor

Annual Ph.D. Progress Report—this form submitted once a year by the Ph.D. student to their Dissertation Advisor and Committee members to gauge the student's progress towards degree completion.

Graduate Research Assistant Performance Evaluation

The following evaluation is intended to critique the performance of the research assistant in the job duties they have been assigned for the semester. This form should be used as a constructive tool to modify future performance and as an accountability indicator that may impact eligibility for assistantship positions in the future semesters.

Student Name:_____

Evaluator:_____

Date and Term of Evaluation:_____

Rating scale: 1- unacceptable, 2- needs improvement, 3- meets expectations, 4- exceeds expectations

Duties/Responsibilities

Takes initiative to work independently and complete tasks	1	2	3	4	N/A
Follows safety procedures	1	2	3	4	N/A
Completes assigned work in a timely manner	1	2	3	4	N/A
Shows careful attention to detail in work	1	2	3	4	N/A
Exhibits prompt and effective communication	1	2	3	4	N/A
Adheres to deadlines set by supervisor	1	2	3	4	N/A
Understands significance of research	1	2	3	4	N/A
Is able to work as part of a research team	1	2	3	4	N/A
Making progress toward project goals	1	2	3	4	N/A

Recommended for continued GRA support **YES** **NO**

_____ _____
Graduate Research Assistant Signature Date

_____ _____
Supervisor Signature Date

_____ _____
Graduate Coordinator Signature Date

Please write additional comments on the back of this form.

Graduate Teaching Assistant Performance Evaluation

The following evaluation is intended to critique the performance of the teaching assistant in the job duties they have been assigned for the semester. This form should be used as a constructive tool to modify future performance and as an accountability indicator that may impact eligibility for assistantship positions in the future semesters.

Student Name:_____

Evaluator:_____

Date and Term of Evaluation:_____

Rating scale: 1- unacceptable, 2- needs improvement, 3- meets expectations, 4- exceeds expectations

Duties/Responsibilities

Arrives on time to class and prep sessions	1	2	3	4	N/A
Is prepared for class	1	2	3	4	N/A
Behaves (in actions and speech) professionally	1	2	3	4	N/A
Attire is appropriate for lab safety	1	2	3	4	N/A
Can lecture independently with supervision	1	2	3	4	N/A
Presents instructions that are clear and thorough	1	2	3	4	N/A
Is knowledgeable about subject matter		1	2	3	4
N/A					
Is prompt in communication with instructor	1	2	3	4	N/A
Can answer student questions correctly and effectively	1	2	3	4	N/A
Takes initiative to work independently and complete tasks	1	2	3	4	N/A
Grades homework and exams in a timely manner	1	2	3	4	N/A
Is actively engaged with students during activities	1	2	3	4	N/A
Keeps attendance and grading records	1	2	3	4	N/A

Recommended for continued GTA support **YES** **NO**

_____ _____
Graduate Teaching Assistant Signature Date

_____ _____
Supervisor Signature Date

_____ _____
Graduate Coordinator Signature Date

Please write additional comments on the back of this form.

Annual Dissertation Research Report

Student Name_____

Term and Date_____

Please provide the requested information in space provided below. If the space provided is inadequate, please append additional sheets as needed.

List any presentations you made this semester. Provide the full citation.

List any publications you published this semester. Provide the full citation.

List any awards you were nominated for this semester (indicate status: received, did not receive, pending):

List any grants, including travel awards, that you applied for and their status (received, did not receive, pending).

Provide a brief update on the status of your degree and pathway to completion.

Please tell me about any other accomplishments you would like to share.

What is your anticipated graduate term?