

BIOMOLECULAR SCIENCE GATEWAY Ph.D. STUDENT HANDBOOK FALL 2023

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1. Program Overview

1.1. Mission Statement

Michigan State University's (MSU) BioMolecular Science (BMS) Gateway's mission is to recruit and retain a diverse pool of creative and motivated individuals for its dynamic biological sciences research community.

1.2. Overview

The BioMolecular Science Gateway (BMS) offers admission to six graduate programs: Biochemistry and Molecular Biology; Cell and Molecular Biology; Genetics and Genome Sciences; Microbiology and Molecular Genetics; Pharmacology and Toxicology; and Molecular, Cellular, and Integrative Physiology. Students have access to training in over 180 research laboratories with various research areas including, but not limited to, cancer, computational biology, developmental and reproductive biology, drug discover, ecology and evolution, environmental toxicology, gene expression, host-pathogen interactions, immunology, metabolism and synthetic biology, molecular basis of disease, molecular biophysics and enzymology, neurophysiology, and plant biology/pathology. MSU has multiple state of the art facilities, including NMR, mass spectrometry, DNA and peptide synthesis, genomics and transcriptomics, proteomics, cell sorting, and electron and cryo-electron microscopy.

The major objectives of the BMS-affiliated graduate programs are to help students develop their creative potential and to prepare them for a variety of science-related careers. Individual programs of study are designed to develop independent thinking, broaden scientific knowledge, as well as hone technical and professional skills, through formal and informal courses, laboratory experience, seminars, individual study, and, foremost, through original research that forms the basis for the student's thesis or dissertation.

During their first two semesters, students rotate through up to three laboratories of potential Ph.D. mentors for eight weeks each and take four courses (two each semester) that contribute to fulfilling the requirements of their disciplinary interests. In addition, students attend a weekly forum in both fall and spring semesters. In the spring semester of their first year, students select the Ph.D. program that aligns most closely with their educational goals.

The Ph.D. is the terminal degree for professional scientists who seek to design, execute, and direct independent research projects. The heart of the Ph.D. training program is an original and creative research project that moves the field forward and forms the basis of the doctoral dissertation. The specific course of study is decided in consultation initially

with the BMS Graduate Program Director or Associate Director and later with a Guidance Committee composed of faculty members and chaired by the thesis advisor.

Students also have the option to complete joint degrees with affiliated academic departments or interdepartmental programs such as the Molecular Plant Science Program; the Ecology, Evolution and Behavior Program; and the Environmental and Integrated Toxicological Science Program. Students with a particular interest in college-level teaching can earn a Certificate in College Teaching (CCT). Information can be found on the graduate school's website here: <https://grad.msu.edu/CCTP>.

All BMS graduate students receive financial support throughout the course of their studies. First year BMS students are supported by graduate research assistantships or fellowships for their rotations. Subsequent years of support come primarily from the research mentor. Stipends are set annually and are competitive with those provided by departments and other programs at MSU, as well as with those at other prominent universities in the USA. In addition, all graduate assistants receive up to nine credits tuition waiver for each fall and spring semesters (six credit is full time for doctoral students), five credits for summer semester, and paid health insurance.

1.3. People to Contact for Information

Academic Issues or General Questions

Jake Wier

wierjake@msu.edu

517-353-9845

2165 Biomedical Physical Science

BMS Directors/Academic Advising/Faculty Mentoring

John LaPres, BMS Graduate Director (Advising Last Names A-J)

lapres@msu.edu

224 Biochemistry

Claire Vieille, BMS Associate Director (Last Names K-Z)

vieille@msu.edu

6172 Biomedical Physical Science

Graduate Recruitment Initiative Team

Kaylee Wilburn (Director) wilburn8@msu.edu

Jenny Schuster (Peer Mentorship Co-Coordinator) schust97@msu.edu

Jasper Gomez (Peer Mentorship Co-Coordinator) gomezjas@msu.edu

1.4. Contacts for Each BMS Major

Biochemistry and Molecular Biology

Dr. Erik Martinez Hackert emh@msu.edu

Jessica Lawrence jesslaw@msu.edu

Cell and Molecular Biology

Dr. Peggy Petroff petrof10@msu.edu

Alaina Burghardt mannieal@msu.edu

Genetics and Genome Sciences

Dr. Claire Vieille vieille@msu.edu

Alaina Burghardt mannieal@msu.edu

Microbiology and Molecular Genetics

Dr. Vilma Yuzbasiyan-Gurkan yuzbasiyan@msu.edu

Roseann Bills marshro3@msu.edu

Molecular, Cellular, and Integrative Physiology

Dr. Gina Leinninger leinning@msu.edu

Jasmine Jackson jjack578@msu.edu

Pharmacology and Toxicology

Dr. Jamie Bernard jbernard@msu.edu

Meagan Kroll krollm@msu.edu

2. BMS Program Requirements

Students must meet the course and program requirements specified below:

- Participation in the BMS Retreat (generally held the Friday before Fall classes begin)
- Participation in up to three 8-week laboratory rotations to facilitate selection of a thesis advisor
- Participation in a weekly seminar series (BMS 800, both fall and spring of year one)
- Participation in four core courses (two per semester) in year one. Two of these courses must be selected from the main course list below, using the course requirements for the PhD program they are likely to join at the end of the first year as a guide. The remaining two courses can be selected after a discussion with your BMS Advisor.

2.1. Main Course List

BMB 801	Molecular Biology (F)
BMB 805	Protein Structure, Design, and Mechanism (S)

BMB 829	Methods of Macromolecular Analysis and Synthesis (F)
MMG 801	Integrative Microbial Biology (F)
MMG 833	Microbial Genetics (F)
MMG 835	Advanced Genomics (S)
PHM 801	Fundamental Principles of Pharmacology and Toxicology (F)
PHM 802	Cellular and Molecular Integrative Systems Pharmacology and Toxicology (S)
BMB 825	Cell Structure and Function (S)
PSL 829	Cellular and Integrative Physiology II (F)
PSL 828	Cellular and Integrative Physiology (S)

3. Program Policies

3.1. Financial Support

All students accepted into the BMS Gateway receive financial support in the form of a fellowship or a graduate assistantship while performing their rotations. This support includes a stipend, graduate student health insurance, and a tuition waiver. The minimum stipend rates for research and teaching assistants can be found here: <https://hr.msu.edu/employment/graduate-assistants/stipend-ranges.html>

Thereafter, graduate assistantships are generally funded from research grants or other sources available to the student's major professor(s). BMS students should discuss future funding with potential mentors during the lab selection process.

It is the responsibility of the student to closely monitor their student account and employment records to ensure that there are no issues with their financial support. Should the student be over-paid, it is the responsibility of the student to alert departmental/programmatic administration. In most cases, the student will be required to return the full overpayment amount.

2023-2024

For August 16, 2023 to August 15, 2024, BMS Research Assistants and Teaching Assistants will receive an annual stipend of \$34,819.09.

3.2. Work Hours

Students should be actively engaged in course work, research, literature reviews, or some other phase of the doctoral program, even during semester breaks.

All students, regardless of the type of financial support, are viewed by the Department as accepting a responsibility equivalent to that of a half-time graduate assistant. The amount a student works in the lab should be based off a discussion between the student and their rotation/PhD advisor.

A graduate assistant is entitled University staff holidays designated in the University calendar and vacation time as settled with the rotation period advisor or BMS Graduate Director. Between-semester periods and Spring break are not considered holidays. Any absence from the University, except those authorized for scientific meetings, etc., must be approved.

3.3. Illness/injury/pregnancy leave

A graduate assistant unable to fulfill the duties of their appointment because of illness, injury, or pregnancy shall notify the BMS Director or Associate Director as soon as circumstances permit.

During illness, injury, or pregnancy the BMS Director, in consultation with the rotation mentor, shall adjust (reduce, waive, or reschedule) the graduate assistant's duties as those duties and the assistant's physical circumstances reasonably dictate. If total absence from duties becomes necessary, the BMS shall maintain the stipend of the appointment, provided the graduate assistant is still enrolled, for a period of two months, or to the end of the appointment period or of the semester, whichever should occur first.

The graduate assistant shall have the right to return to the assistantship, within the original terms of the appointment, at such time as they are able to reassume the duties of the position.

3.4. Academic Files

Students may access their academic file by request. Students have the right to review their academic file (except confidential admissions recommendation letters) and challenge the accuracy of its contents by writing a rebuttal that becomes part of their file.

3.5. Academic Performance

The BMS program accepts only those students who are believed to have the potential to successfully complete the degree program. Depending on the program of choice, students are expected to earn grades of 3.0 or above (out of 4.0) in all their required courses or maintain an average GPA of equal to or greater than 3.0. Students receiving a 2.5 or lower grade in a required course are expected to take that course again or an equivalent course.

Students unable to find a research lab for their PhD after their three rotations will likely be asked to complete a fourth rotation.

Should lack of such success or non-passing grades be evident, actions including repeating a class, performing an additional rotation, dismissal, or a leave of absence may be implemented at the discretion of the BMS Director, in consultation with BMS faculty.

3.6. Rights, Responsibilities, and Ethical Standards

The Spartan Code of Honor Academic Pledge:

“As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do..”

All graduate students are entitled to the general [Student Rights and Responsibilities \(SRR\)](#). The [Graduate Student Rights and Responsibilities \(GSRR\)](#) documents establish the rights and responsibilities of MSU graduate students and prescribe procedures to resolve allegations of violations of those rights through formal grievance hearings. In accordance with the SRR and the GSRR, the BMS will adhere to the procedure set forth by the MSU Ombudsperson to address academic grievances.

Graduate students in the BMS are expected to adhere to the ethical standards set forth in University regulations (www.grad.msu.edu/researchintegrity/) and those conventionally used in the conduct of scientific research.

3.7. Responsible Conduct of Research, Scholarship, and Creative Activities (RCRSCA, RCR for short)

CITI Modules Year 1

- Introduction to the Responsible Conduct of Research
- Authorship
- Plagiarism
- Research Misconduct

6 hours discussion-based training (complete before finishing comprehensive examination and entering candidacy status, doctoral students starting in Fall 2020 or later)

CITI Modules Year 2

Complete 3 of 6 possible RCR Basic modules:

- Collaborative Research
- Conflicts of Interest
- Data Management
- Mentoring

- Peer Review
- Financial Responsibility

Year 3 forward

3 hours of annual refresher training

Tracked automatically in Ability =

Tracked by department in GradInfo =

The basic education program consists of 3 requirements:

1. **Four (4) online [CITI \(Collaborative Institutional Training Initiative\) training modules.](#)** (Due by the end of the student's first year).
2. **A minimum of 6 hours of face-to-face, discussion-based workshops.** (Due by the time of graduation for Master's students and before completing the comprehensive examination and entering candidate status for doctoral students). Each department or college has developed a RCRSCA plan including when and how to satisfy the discussion-based training hours. Please review this plan (found in your graduate handbook) and verify with your Graduate Program Director. Options may include:
 1. Completing [workshops offered by the Graduate School](#) (each counts for 1.5 hours),
 2. Completing workshops offered by your academic unit,
 3. Completing approved coursework containing relevant content, and/or
 4. Participating in discussions with your advisor (group meetings or one-on-one discussions).
3. **Three (3) additional on-line CITI modules for Master's Plan A and Doctoral students.** These 3 additional CITI modules can be chosen from the supplemental modules listed in CITI. (Due by the end of the student's second year).

In addition to the basic education requirements, all doctoral and graduate professional students must complete 3 hours per year of supplemental, refresher RCRSA education. This requirement could be met in the following ways:

1. Completing additional CITI modules (from the supplemental modules listed in CITI, each module counts as 45 min)
2. Completing [additional face-to-face workshops from the Graduate School](#),
3. Participating in designated RCRSCA activities in an academic unit,
4. Holding one-on-one or group discussions with one's advisor, and/or
5. Other activities.

The Graduate School has compiled [many resources](#) for discussion-based completion of the RCRSCA requirements. Each department or college has developed a detailed RCRSCA plan including when and how to satisfy the discussion-based training hours.

Please review this plan (found in your graduate handbook) and verify with your Graduate Program Director.

The current basic RCRSCA education took effect January 1, 2017.

3.7. Admission

The BMS admissions process attempts to select those applicants with the most promise for superior achievement and does not establish minimum cut-off values on any indices. The following standards serve only as a general guideline. The successful applicant will typically have:

- Equivalent to a four-year bachelor's degree that includes coursework demonstrating proficiency in math and science. (The intermediate attainment of a master's degree is not required.)
 - An undergraduate GPA of 3.5
 - Research experience
 - Strong letters of reference that include evaluation of the applicant's research experience.
 - Demonstration of attributes that might positively impact their chance of success, such as leadership, creativity, commitment to diversity, and community outreach.
1. To apply to the BMS program: Submit an MSU online application form, which can be obtained through the MSU Graduate School website at <https://admissions.msu.edu/apply/graduate-students>
 2. The application requires an **academic statement**. This statement should discuss your motivations for pursuing a graduate degree and your experiences that are pertinent to the discipline, such as undergraduate research, publications, and workshops you have completed.
 3. The application also provides space for a **personal statement**. You may discuss elements of your history that demonstrate leadership potential, your potential contribution to a diverse educational community, and your record of overcoming obstacles. If preferred, these two statements may be combined into a single academic statement.
 4. Three letters of recommendation from individuals that can attest to your academic and/or research experience. The MSU online application process allows you to submit **electronic letters of recommendations**. The online application portal allows applicants to submit the name and email addresses of faculty that they would like to provide letters of recommendation on their behalf. The system will automatically notify the recommenders of their request and instruct the recommenders of the procedure to submit the letters electronically, or the

recommenders may send letters directly to the BMS office via email to bmsgrad@msu.edu.

5. The MSU office of admissions requires official transcripts from **all** undergraduate institutions. While unofficial transcripts may be used for the review process, official transcripts are necessary before accepting any offer of admission. International students have to follow the procedure outlined for English Language Competency set by the Graduate School here: <https://grad.msu.edu/english-language-competency>
6. Application materials should be received by **December 1** for the following fall admission to receive full consideration of admission and funding opportunities.
7. Graduate students usually begin their graduate studies in late August (Fall semester). Students admitted for Fall semester may elect to “start early” by completing their first rotation during the preceding summer. This option must be approved by the BMS director and is not available to international students.

3.8 Evaluation of Progress of First-Year Students

It is in the interest of the student and of the BMS program to evaluate progress throughout the first year of graduate school. At three points during the year, the student’s rotation evaluation form will be used to monitor a student’s progress in developing research skills and finding a research advisor. It is important that these forms are filled out by every rotation advisor and that the feedback is shared with the student and the BMS administration.

Students are expected to find their rotation mentors. The BMS cannot place students who fail to find a rotation into a lab, but the BMS administration will provide guidance as to which faculty are seeking students. It is important to remember that rotations are meant to expose students to interdisciplinary science. Therefore, a student may have to compromise on their primary research interests to find a lab in which to rotate. No lapses should exist between rotation periods. Should there be a lapse of more than one week between rotations, a written notice of probation will be given to the student informing them that they have one more week to start a rotation before having their financial appointment suspended. If a student fails to find a rotation during that week, the BMS will provide a notice of grounds for dismissal from the graduate program immediately or at the end of the academic semester depending on the student’s performance in their courses.

At the end of the first academic year, since most students will not have formed their research guidance committees yet, the Director of Graduate Programs of the students’ chosen major will review the academic and research progress in consultation with the BMS director.

4. The Rotation System

A research rotation system allows students to complete up to three rotations during their first two semesters. Laboratory rotations are approximately eight weeks, each in the laboratory of three different faculty members. The purpose for rotations is twofold. One is to provide a means for students to work in a focus area, become familiar with major objectives of an area of research, and to learn methods used to probe research problems. The second purpose of the laboratory rotation is to identify a research mentor and to discuss and investigate potential thesis projects with that prospective mentor. Rotations provide an excellent opportunity for students to learn first-hand the research activities of various laboratories. In turn, rotations are an opportunity for faculty to observe and evaluate the research potential of rotation students, and to interact on a personal level.

BMS students are expected to participate in three research rotations, however, they are not all required. If a student wants to join a lab after one or two rotations, they can discuss their decision with the BMS Director. During this meeting, the BMS Director will determine if the PI and student understands the financial ramifications of this decision. Finally, under exceptional conditions, a student may petition the BMS Director to allow a fourth rotation.

4.1. Rotation Selection

Over 180 faculty are associated with the six BMS-affiliated units. However, not all faculty will have space or funding to accommodate rotation students. Faculty may accept two or three rotation students but have funding to accept only one student into their lab. Students should be mindful of the likelihood of joining the lab when making their rotation selections.

In the week prior to beginning the Fall semester, incoming BMS students participate in an orientation program. During that week, principal investigators from Biochemistry and Molecular Biology, Cell and Molecular Biology, Genetics Program, Microbiology and Molecular Genetics, Physiology, and Pharmacology and Toxicology present short talks on their work, with the goal being to familiarize students with the breadth of research performed on this campus and to help them choose laboratories in which to rotate.

Students are encouraged to view BMS and departmental faculty web sites that describe research interests and recent publications. BMS students have additional opportunities to familiarize themselves with faculty at the BMS Fall Retreat. It is suggested that students read one or two recent publications written by a faculty member in whose laboratory they might wish to do a rotation, and then meet with the faculty member and discuss the possibility of a laboratory rotation. The issue of funding should be discussed at that meeting. Do not hesitate to raise the issue if the faculty member does not address it.

The student may request assistance from the BMS Director or Unit Graduate Programs Director in selecting a laboratory, particularly if difficulties in selecting a mentor are encountered.

Students must notify BMS administrators of their rotation selection at least the Friday before the beginning of the next rotation period. If students are considering a rotation with a faculty who is not yet affiliated with the BMS, approval from the BMS Director is required. Students may select all three rotations at the beginning of the academic year, or select appropriate laboratories for additional rotations as the academic year progresses. Students must notify BMS administrators of their rotation selection at least the Friday before the beginning of the next rotation period. If students are considering a rotation with a faculty who is not yet affiliated with the BMS, approval from the BMS Director is required.

[Grand Rapids Research and Secchia Centers](#)

Students may elect to complete one or more of their rotations at the Grand Rapids Research Center or at the Secchia Center in Grand Rapids, Michigan. Students are responsible for discussing hybrid class options with their professors. Students may apply for a Road Fellowship to help defray the cost of commuting.

4.2. Rotation Participation

Emphasis during the rotation period should be on 1) active participation and intellectual engagement in laboratory research, 2) gaining a working knowledge of the field, and 3) production of sufficient experimental results that allow a valid evaluation of the student's potential for a career in research. Students should plan on spending at least 20 hours per week on the rotation assignment. The specific activities in each rotation may vary among laboratories; these activities and expectations should be defined at the outset by the faculty member. These activities are likely to include reading background and project-specific scientific literature; design, execution, and analysis of experiments; discussion of research project opportunities; interactions with other lab members; and presentation of the rotation project effort at a lab group meeting.

4.3 Rotation Evaluation

Each faculty member with whom the student works during the rotation periods will continuously evaluate the student's performance. The student should initiate frequent meetings with the faculty members during the rotation period to discuss their progress in the laboratory. At the end of each rotation period, a written evaluation will be discussed with and signed by the student. The rotation faculty advisor will discuss the student's performance during a meeting at the end of each research rotation. The written evaluation will be maintained in the student's file.

5. Selection of thesis/dissertation advisor and major

It must be understood that selection of a dissertation research advisor by the student does not guarantee acceptance by the faculty member. Space and funding limitations, as well as differences in research attitude are necessary factors that must be considered.

After a mutual agreement is reached between a student and a professor, the student must immediately notify the BMS program director and the department or graduate program directors in writing so that departmental approval and administrative records can be established.