DOCTOR OF PHILOSOPHY (PH.D.) IN BIOMEDICAL SCIENCES DEGREE PROGRAM

- Biochemistry and Molecular Biology (BMB) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/biochemistry-molecular-biology-phd/)
- Biomedical Engineering and Physiology (BMEP) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/biomedical-engineering-physiology-phd/)
- Clinical and Translational Science (CTS) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/clinical-translational-science-phd/)
- Immunology (IMM) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/immunology-phd/)
- Molecular Pharmacology and Experimental Therapeutics (MPET) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/molecular-pharmacology-experimental-therapeutics-phd/)
- Neuroscience (NSC) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/neuroscience-phd/)
- Regenerative Sciences (REGS) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/regenerative-sciences-phd/)
- Virology and Gene Therapy (VGT) – Ph.D. Degree (https://catalog.mayo.edu/graduate-biomedical-sciences/phd-degree-programs/virology-gene-therapy-phd/)

Overview

The Biomedical Sciences Ph.D. Program is intended to train students in the most modern approaches to biomedical research, and to assist with development of analytical, technical, oral, and written communication skills, which allow students to become independent investigators of the most important and challenging problems in biomedical research.

Students are provided with a supportive atmosphere where they can find role models and mentors to emulate in the development of their research skills and begin acculturation into the biomedical research community. Courses introduce students to the body of information most important to their subsequent research endeavors and other educational activities facilitate the development of independent learning skills. Students are assisted with formulation of career goals and pathways which best utilize their individual talents and skills.

Mayo Clinic's Ph.D. program places heavier emphasis on research training than on course work. This philosophy is a natural outgrowth of the institution's long history as a center for investigation in the life sciences. Courses are, nevertheless, an integral part of the Ph.D. program providing the intellectual foundation necessary for a well-rounded scientist. A minimum of 66 credits is required of all Ph.D. students matriculating 2020 and forward; 42 for matriculants prior to 2020. (Difference now granting credit for Predoctoral Research course registration vs. no credit.) Mayo Clinic's graduate level courses in specific disciplines of the basic sciences will be adequate preparation for most students. All Ph.D. candidates must complete at least two years of full-time course registration at Mayo to be eligible for the degree.

Admission

Appointment Requirements

Candidates for the Ph.D. Program must meet the following eligibility requirements:

- Completion of a bachelor's degree, preferably in the biological or physical sciences, from an accredited institution.
- A minimum cumulative undergraduate GPA of 3.0 on a 4.0 scale. GPAs from graduate degrees may also be considered for competitive candidates if improvement of academic record is evident.
- Applications are considered only if submitted within the application submission window of September 1 – December 1 each year, for appointment in the following academic year. See also Admissions and Application Process (https://college.mayo.edu/academics/biomedical-research-training/phd-program/how-to-apply/).
- Degree conferral before the program begins (program begins in July)
- The Ph.D. program does consider international applicants who can demonstrate proof of English language proficiency. See also international applicant information (https://college.mayo.edu/academics/biomedical-research-training/phd-program/how-to-apply/international-applicant-information/).

Suggested undergraduate coursework:

- Applicants to our Ph.D. program are encouraged to have completed coursework with demonstrated proficiency (B average or above) in their math and science courses. Additionally, advanced courses in biology, chemistry, and physiology are encouraged.
- Applicants interested in applying to the Biomedical Engineering and Physiology Track are advised to take courses in quantitative science and engineering, such as signal processing, computer science, and instrumentation.

Authority to make appointments rests with the Mayo Clinic Graduate School of Biomedical Sciences Education Committee. Falsifying or omitting information on or accompanying the application may disqualify an applicant from admission or subject a student to dismissal. The application and supporting documents become the property of MCGSBS upon receipt. The average number of years to degree is 5.2.

Inquiries regarding admission to the MCGSBS Ph.D. Program should be sent to this inquiry form (https://college.mayo.edu/academics/biomedical-research-training/contact/).

Admissions/Financial Support

- PhD students are fully supported through a guaranteed internal fellowship for five years, eliminating the need to identify a faculty member to provide financial support. The annual base stipend for PhD students funded by Mayo Clinic for the 2025-2026 academic year is $41,200, deposited electronically bi-monthly in the student's bank of choice. The annual tuition fee is waived in full ($27,000).
- Appointment and funding are conditional on remaining actively enrolled in the program, continuously meeting the qualifications, standards and requirements of the program and track.
- Funding may consist of graduate school, external fellowships and/or internal scholarships.

- Students are appointed for five years with designated program start and end dates.
- If required training exceeds the appointment length, a request for extension may be made for consideration. All extension requests require graduate school approval and funding to cover all student costs during the extension period are typically paid by the student's mentor.
- Training must be completed within a maximum of seven years, regardless of funding availability.
- Students who enter MCGSBS with pre-awarded Mayo department/division funding will continue under the terms of any such arrangements throughout the duration of their PhD training.

Transfer Credits

A total of 21 credits may be transferred into the Ph.D. Program. For more details, see the Credit Conversion, Transfer, Waiver, and Substitution Policy on the MCGSBS Policies and Procedures intranet site.

MGS Curriculum

The MGS curriculum has been designed to provide a common fundamental knowledge base and technical language supporting multiple discipline-specific, advanced fields.

Summer - 1st Year

Code	Title	Hours
MGS 6000	Responsible Conduct of Research	1
MGS 5010	Rigor, Reproducibility, Experimental Design, and Data Management	1
MGS 5000	Foundational Skills	1
MGS 5030	Core Concepts in Genome Dynamics, Biochemistry, Cellular Biology, and Physiology	3
Statistics Requirement		1

Summer/Fall - 2nd Year

Code	Title	Hours
MGS 5050	Critical Thinking and Scientific Writing	2
MGS 5051	Critical Thinking and Scientific Writing, Part II	1

*Required of all students. The NIH requires Responsible Conduct of Research (RCR) instruction at least once during each career stage, and at a frequency of no less than once every four years. Ph. D. and M.D.–Ph.D. students will be notified by MCGSBS when they are required to take the refresher course and no grade will be assigned. Students who are enrolling in the refresher course will register for MGS 6001.

Laboratory Rotations

Each student must complete three laboratory rotations in three different laboratories for a total of six credits. Rotations must be done in the laboratories of faculty with full graduate faculty privileges. These credits count towards the track credits required. Some comparable research experiences already completed may be considered to substitute for a required lab rotation. Eligible experiences for consideration include:

- Summer Undergraduate Research Fellowship (SURF);
- Mayo Post-baccalaureate Research Education Program (PREP);
- Graduate Research Education Program (GREP);
- and relevant Master's degree or other post-baccalaureate experience.

For more details see the Lab Rotations Policy on the MCGSBS Policies and Procedures intranet site.

Mentor Selection

Completion of lab rotations is required in order to allow students a variety of experiences to help decide on selecting an mentor and home laboratory for completion of their thesis research work during the remainder of their training. A Ph.D. student's mentor must have full graduate faculty privileges and must be selected timely after all required laboratory rotations have been completed. For more details see the Mentor Selection, Withdrawal and Transfer Policy on the MCGSBS Policies and Procedures intranet site. Once a mentor is selected, the student must register for MGS 6890 Predoctoral Research every term for which they will be given a grade of Satisfactory or Not Satisfactory by the mentor.

Official Degree Planning Tools

The use of a Degree Planning Tool (DPT) is required and allows students to list the course work to fulfill degree requirements, including transfer credits. The DPT must be completed during the first academic year and should be updated as courses are completed throughout the training program. A final completed DPT must be submitted to the school when a tentative defense date has been determined to be cleared to graduate. The DPT is available on the MCGSBS intranet site under For Students/General Forms/Resources/PhD Forms.

Graduation

Students are granted degrees four times a year (3rd Friday except in May it is the date of commencement): February, May, August, and November. The May date involves a formal ceremony as part of the Mayo Clinic graduation exercises in conjunction with MCASOM. No ceremony is held in February, August, and November, but students who graduate at one of these times are encouraged to participate in the May ceremony.

Students are allowed no more than 30 days to complete Ph.D. degree requirements after a successful thesis defense. Students should also keep in mind that Ph.D. appointments in MCGSBS will continue no more than 30 days beyond a successful thesis defense when scheduling the thesis defense. If a student does not meet the thesis deadline, they will be required to re-defend their thesis.

For degree conferral in:	Defend by:	All Post-Defense Requirements completed by:
February	January 1	February 1
May	April 1	May 1
August	July 1	August 1
November	October 1	November 1

Students are expected to make continuous and successful academic and professional progress toward graduation requirements for the Ph.D. degree. The concept of satisfactory progress mandates monitoring of a students' academic and professional performance through items including, but not limited to:

- Register for at least one course all terms throughout training
- Complete Degree Planning Tool (DPT)
- Pass Written Qualifying Exam
- Submit Oral Qualifying Exam Committee Selection
- Pass Oral Qualifying Exam

- Submit Thesis Proposal (Data to be included in the Ph.D. thesis must be generated after admission to the Ph.D. program)
- Mentor Selection
- Thesis Advisory Committee (TAC) Selection
  - Submit application for a fellowship award (or equivalent) as defined in the Fellowship Application and Award Policy.
- Routine TAC meetings and Progress Reports, minimum every six months
  - Completed final Progress Report reflecting TAC approval for defense must be received by the graduate school to be eligible for graduation.
- Individualized Development Plan completed and maintained throughout training
- Minimum of one peer-reviewed first-authored original paper accepted for publication (unless exception approved- see Publication Exception Request Procedure)
- Submit thesis per MCGSBS Thesis Guidelines for Ph.D.
- Final Oral Exam/Thesis Defense
- Meet any program specific competencies as defined by track

Full details are included in the Academic Progress and Graduation Requirements for PhD Policy on the MCGSBS Policies and Procedures intranet site.

Qualifying Examinations

The qualifying examinations are intended to test the student's fund of information in the sciences related to the chosen field of study and to evaluate the student's ability to reason critically.

Written Qualifying Examination

The written qualifying examination will test the breadth of biomedical knowledge, and analytic and critical reasoning skills. The content and format of the examination is determined by each track. For more details, see the Written Qualifying Exam Procedure on the MCGSBS Policies and Procedures intranet site.

Oral Qualifying Examination

Oral qualifying exam committee composition is determined collaboratively between student and student's mentor and requires approval of the program director and the school. All members must have graduate faculty privileges. For more details, see the Oral Qualifying Exam Committee Selection and Procedure on the MCGSBS Policies and Procedures intranet site.

Thesis

Thesis Advisory Committee

Ph.D. candidates are expected to submit to the MCGSBS office the composition of their Thesis Advisory Committee (TAC) within 90 days of selecting a mentor via the Thesis Advisory Committee Section eForm. The TAC composition is determined collaboratively between student and student's mentor and requires approval of the program director and the school. For more details, see the TAC Member Selection and Documentation for PhD/MD-PhD Programs Procedure on the MCGSBS Policies and Procedures intranet site.

Progress Meetings

The Thesis Advisory Committee must meet at minimum every six months from the date of committee approval. Documentation of student progress using a progress meeting report form, must be signed by all members of the Thesis Advisory Committee and submitted to MCGSBS administration. The report form template can be found on the PhD Program Forms web page.

Thesis Proposal

A written thesis proposal, including presentation and thesis committee discussion of the proposal, is a requirement that may be accomplished during the oral qualifying examination or at a separate committee meeting for this purpose. The TAC must be approved prior to this committee discussion.

The Mayo Institutional Review Board must review all protocols for research involving the use of human subjects. It is the candidate's responsibility to secure approval of any such protocols before the research is undertaken.

Preparation of Thesis

The thesis is the most important document that the Ph.D. candidate will prepare during the course of graduate study and is a record of the scientific accomplishments that justify the awarding of the degree. Consequently, MCGSBS has developed standards for its format and style, which should be closely followed. MCGSBS Thesis Guidelines for Ph.D. thesis are available on the MCGSBS intranet site under For Students/ General Forms/Resources.

Fellowship Award Submission

Students must submit an application for extramural fellowship award or equivalent during their training.

- All Ph.D. students must submit a fellowship application, preferably during their 2nd year of study but by end of 3rd year. (Applies to students who matriculated in 2020 or after.) Alternatives for international students are explained in the Academic Success and Graduation Requirements Policy.
- Students unable to identify an external organization to apply for a fellowship award must submit an F31 grant application template internally to the graduate school to meet this graduation requirement.

For more details, see the Fellowship Application and Award Policy on the MCGSBS Policies and Procedures intranet site.

Publication Requirement

Ph.D. thesis research must make a substantial contribution to the biomedical literature and preparing work for publication is an important part of research training. The expectation is that student thesis research will result in multiple publications, with the requirement for graduation of a minimum of one peer-reviewed first-authored original paper accepted for publication. Students are required to indicate in publications their affiliation with and support from MCGSBS. Exceptions to the publication requirement must be submitted as a recommendation from the TAC with endorsement from the program director, and approval by the MCGSBS Education Committee. For more details, see the Publication Requirement Policy and Publication Exception Request Procedure on the MCGSBS Policies and Procedures intranet site.

Final Oral Examination

The final oral examination will be scheduled after 1) the written qualifying and oral qualifying examinations have been passed, 2) MCGSBS has completed a graduation clearance audit confirming that all course and non-course requirements have been met, and 3) a a TAC Progress Report is submitted to MCGSBS reflecting TAC approval that student is ready to

defend. For more details, see the Final Oral Examination-Thesis Defense Procedure on the MCGSBS Policies and Procedures intranet site.

Final Thesis Corrections

After the student has passed the final oral examination, the student has no more than 30 days from the defense date to complete all post-defense requirements, including final thesis corrections. The chair of the Thesis Advisory Committee must sign a form verifying the final corrections to the thesis have been made. MCGSBS will not certify completion of degree requirements until the final thesis has been submitted. If a student does not meet the thesis corrections deadline, they will be required to re-defend their thesis.

The final thesis is uploaded into ProQuest for publication with the option of adding a publication hold if needed. If a student does not wish to have their thesis published, they must submit a PDF version of the final thesis to the graduate school by their student end date.