REGENERATIVE SCIENCES (REGS) – PH.D. DEGREE

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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.

Course Work

The curriculum for the Predoctoral degree consists of **68 credits**, which can include a maximum of 24 Research credits.

Code	Title	Hours
MGS		
MGS 6000	Responsible Conduct of Research	1
MGS 5000	Foundational Skills	1
MGS 5050	Critical Thinking and Scientific Writing [1]	2
MGS 5051	Critical Thinking and Scientific Writing, Part II	1
MGS 5010	Rigor, Reproducibility, Experimental Design, and Data Management	1
MGS 5030	Core Concepts in Genome Dynamics, Biochemistry, Cellular Biology, and Physiology [1]	3
Statistics [1]		**1**
CTSC 5590	Foundations of Statistics in Clinical and Translational Research	
CTSC 5600	Introduction to Statistics in Clinical and Translational Research	
Lab Rotations [3]		
6 credits maximum, a minimum of 3 rotations		
MGS 5102	Ph.D. Laboratory Rotation	2
MGS 5107	Ph.D. Laboratory Rotation	2
MGS 5108	Ph.D. Laboratory Rotation	2
Track Requirements		
REGS 5300	Stem Cells & Development	3
REGS 5800	Developmental Biology	2
REGS 6300	Experimental Methods in Regenerative Sciences	1
REGS 6400	Regenerative Tissue Engineering Principles (RTEP)	4
REGS 6500	Introduction to Translational BioProduct Development	2
REGS 6820	Principles to Practice	2
Research		

MGS 6890	Predoctoral Research (3 cr./qtr x minimum 8 terms) [5]	24
Advanced Coursework		
Select 14 credits [6]		14
Recommended Elective Courses		
REGS 5200		
REGS 5210	Advanced Regenerative Medicine and Surgery	
REGS 5500	Topics in Regenerative Sciences and Medicine [7]	
REGS 6700	Genomic and Epigenomic Data Integration	
IMM 6865	Regenerative T Cell Immunotherapy and Cellular Engineering	
IMM 5100	Basic Graduate Immunology	
BMB 5100	Chemical Principles of Biopolymer Systems	
BMB 5150	Molecular Cell Biology	
CTSC 5020	Regulatory Issues in Clinical Research	
CTSC 5025	Introduction to Regulatory Science	
CTSC 6100	Mechanisms of Human Disease	
CTSC 6120	Case Studies in Translation	
VGT 5700	Virology and Gene Therapy	
MPET 5900	Molecular Pharmacology and Receptor Signaling	
MPET 6813	Tutorial in Systems Pharmacology	
NSC 6210	Neurobiology of Disease	
NSC 6857	Systems Neuroscience and Behavior	
NSC 6862	Molecular and Cellular Neuroscience	
Total Hours		**68**

1. M.D.-Ph.D. students may exclude these in accordance with M.D.-Ph.D. requirements.
2. Choose one of the following options. Students must complete a minimum of 1 credit of statistics courses.
3. M.D.-Ph.D. students satisfy this requirement with three one-month full-time rotations.
4. Three credits maximum, (1 cr./yr.) starting year 2
5. Directed research projects under the supervision of a faculty mentor. Students must enroll every quarter once a thesis laboratory is selected for the remainder of program, usually beginning in year 3.
6. In addition to the core and track requirements, elective courses should be selected after consultation between the student, their mentor, and the program director/associate program director, based on area of emphasis.
7. REGS students are required to enroll in REGS 5500 each year (Fall, Winter, and Spring). 3 credits of REGS 5500 may be counted as elective credits.

Potential Pathways to Elective Credits

The following pathways can help you obtain a REGS degree "emphasis" with elective credits.

Regulatory Science in Regenerative Medicine Emphasis

Code	Title	Hours
CTSC 5020	Regulatory Issues in Clinical Research	1
CTSC 5025	Introduction to Regulatory Science	1
CTSC 6120	Case Studies in Translation	2

Data Science in Regeneration Emphasis

Code	Title	Hours
MPET 6813	Tutorial in Systems Pharmacology	2
REGS 6700	Genomic and Epigenomic Data Integration	2

Regenerative Genetic Engineering and Immunology Emphasis

Code	Title	Hours
IMM 5100	Basic Graduate Immunology	3
VGT 5700	Virology and Gene Therapy	3
IMM 6865	Regenerative T Cell Immunotherapy and Cellular Engineering	3

Regenerative Neuroscience

Code	Title	Hours
NSC 6210	Neurobiology of Disease	3
NSC 6857	Systems Neuroscience and Behavior	3
NSC 6862	Molecular and Cellular Neuroscience	3

Qualifying Exams and Thesis Research

Written Qualifying Examination (WQE)

The written qualifying examination tests your breadth of biomedical knowledge, as well as your analytical and critical reasoning skills and is intended to evaluate whether a student has sufficient knowledge and competency in regenerative sciences to continue to PhD candidacy. This examination must be completed before the end of your second year in the program. The REGS Education Coordinator will assist you in ensuring completion of this exam on schedule.

For the WQE, students will develop a research question and prepare a submission-ready pre-doctoral grant application (F31 or equivalent). The pre-doctoral grant will be reviewed by faculty and a passing grade granted for completion of the WQE. The grant proposal will be evaluated to determine the student's understanding of the field of regenerative sciences, ability to establish a research plan to address the proposed question and ability for independent thought.

The following courses must be completed before you take the exam:

- MGS 5010 Rigor, Reproducibility, Experimental Design, and Data Management
- Statistics Requirement (CTSC 5590 Foundations of Statistics in Clinical and Translational Research or CTSC 5600 Introduction to Statistics in Clinical and Translational Research)
- MGS 5030 Core Concepts in Genome Dynamics, Biochemistry, Cellular Biology, and Physiology
- REGS 5300 Stem Cells & Development
- REGS 5800 Developmental Biology
- REGS 6400 Regenerative Tissue Engineering Principles (RTEP)
- REGS 6820 Principles to Practice

*Courses must be completed or students must be concurrently enrolled at the time of the exam.

Oral Qualifying Examination (OQE)

For the oral qualifying examination, students will be evaluated on their theoretical and practical knowledge in the regenerative sciences. Students will defend their thesis research proposal to the Oral Qualifying Exam Committee. The proposal should summarize the goals, methods, and rationale for the research project. This examination must be

completed before the end of your second year in the program. The guidelines for this oral presentation are available from the REGS Education Coordinator. The oral examination is composed of two or three parts. The first part will be an oral presentation by the student of their proposal; the second part will be a discussion between the student and the committee about this proposal.

If there were any conditional elements or weaknesses identified at the time of the written qualifying exam, the committee may then add a third part to the oral examination which will include a wide-ranging discussion of either the area of deficiency or course work material covered by the student during the first two years. Students will be notified after their written qualifying examination whether this third component should be expected during the oral qualifying exam.

Formation of Thesis Advisory Committee (TAC)

REGS students are strongly advised to form a TAC by the end of their first year and within 90 days of mentor selection to support their experiential training. TAC formation at this early stage will help the student and mentor chart progress through coursework, qualifying exams, and project development. TAC members may change during PhD studies. Early TAC formation should be viewed as a starting point to aid the student in formulating specific aims that will form the basis of the thesis proposal. Including a TAC member external to Mayo Clinic is encouraged, but not required.

The student, their thesis mentor and the REGS predoctoral program director/associate director will establish a formal TAC to monitor the student's thesis research progress. The TAC must be approved by the REGS Education Committee. This should be established no later than the beginning of the student's second year. The student's adviser is chair of the committee. Additional requirements regarding committee composition may be obtained from the REGS Education Coordinator.

Thesis Advisory Committee Meetings

Students are required to meet with their thesis advisory committee at least once every six months. At the meetings, the student will present progress on his, her, or their thesis project. The committee will offer advice, and an evaluation of the student's progress will be discussed with the student at the end of the meeting.

Thesis Proposal

Students must complete a written thesis proposal, presentation, and thesis committee discussion of their proposal. This requirement may be accomplished during the written and oral qualifying examinations or at the first thesis committee meeting after advancement to candidacy. The student's TAC must be approved prior to this committee discussion.

Suggested Sequence

This is a suggested course sequence, based on a summer term start. Individual course plans may vary depending on true start date, program, and research interests. Be sure to confirm you have met your requirements using your degree planning tool. Course offerings may vary slightly. Current course offerings are posted in the course catalog.

Code	Title	Hours
First Year - Summer Term		
MGS 5000	Foundational Skills	1
MGS 5010	Rigor, Reproducibility, Experimental Design, and Data Management	1
MGS 5030	Core Concepts in Genome Dynamics, Biochemistry, Cellular Biology, and Physiology	3
MGS 5102	Ph.D. Laboratory Rotation	2
MGS 6000	Responsible Conduct of Research	1
CTSC 5590	Foundations of Statistics in Clinical and Translational Research [1]	1

Code	Title	Hours
First Year - Fall Term		
MGS 5107	Ph.D. Laboratory Rotation	2
MGS 5108	Ph.D. Laboratory Rotation	2
REGS 5300	Stem Cells & Development	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1
REGS 6400	Regenerative Tissue Engineering Principles (RTEP)	4

Code	Title	Hours
First Year - Winter Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1
REGS 6400	Regenerative Tissue Engineering Principles (RTEP)	4
CTSC 5600	Introduction to Statistics in Clinical and Translational Research [1]	3
Electives		4

Code	Title	Hours
First Year - Spring Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1
REGS 5800	Developmental Biology	2
Electives		4

Code	Title	Hours
Second Year - Summer Term		
MGS 6890	Predoctoral Research	3
MGS 5050	Critical Thinking and Scientific Writing	2
Electives		4

Code	Title	Hours
Second Year - Fall Term		
MGS 6890	Predoctoral Research	3
MGS 5051	Critical Thinking and Scientific Writing, Part II	1
REGS 5500	Topics in Regenerative Sciences and Medicine	1
REGS 6500	Introduction to Translational BioProduct Development	2

Code	Title	Hours
Second Year - Winter Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1
REGS 6820	Principles to Practice	2

Code	Title	Hours
Second Year - Spring Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Third Year - Summer Term		
MGS 6890	Predoctoral Research	3

Code	Title	Hours
Third Year - Fall Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Third Year - Winter Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Third Year - Spring Term		
MGS 6890	Predoctoral Research	3

Code	Title	Hours
Fourth Year - Summer Term		
MGS 6890	Predoctoral Research	3

Code	Title	Hours
Fourth Year - Fall Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Fourth Year - Winter Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Fourth Year - Spring Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Fifth Year - Summer Term		
MGS 6890	Predoctoral Research	3

Code	Title	Hours
Fifth Year - Fall Term		
MGS 6890	Predoctoral Research	3
REGS 5500	Topics in Regenerative Sciences and Medicine	1

Code	Title	Hours
Fifth Year - Winter Term		
MGS 6890	Predoctoral Research	3

Code	Title	Hours
Fifth Year - Spring Term		
MGS 6890	Predoctoral Research	3

[1] A minimum of 1 credit of statistics courses are required. See program requirements for course options and details.