IMMUNOLOGY (IMM) – PH.D. DEGREE

- Kay L. Medina, Ph.D., *Program Director*
- Kathryn Knoop., Ph.D., *Associate Program Director, MN*
- Henrique Borges da Silva, *Ph.D. Associate Program Director, AZ*

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. (Matriculants prior to 2020 have 42 credit requirement, not counting Research credit.)

Code	Title	Hours
MGS		
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 [1]	3
MGS 6000	Responsible Conduct of Research	1
MGS 5050	Critical Thinking and Scientific Writing [1]	2
MGS 5051	Critical Thinking and Scientific Writing, Part II	1
IMM 5100	Basic Graduate Immunology	3
Statistics [2]		**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		
IMM 6863	Current Topics in Immunology (One credit per term) [4]	4
IMM 6885	Tutorial in Generation and Function of B Cells	2
IMM 6884	Tutorial in Generation and Function of T Cells	2
IMM 6867	Colloquium in Research	1
IMM 6878	Tutorial in Innate Immunity	2

IMM 6879	Tutorial in Adaptive Immunity	2
IMM 6880	Tutorial in Tissue Immunity	2
IMM 6882	Tutorial in Bridging Innate and Adaptive Immunity	2
Advanced Coursework [5, 6]		**9**
Research		
MGS 6890	Predoctoral Research (3 cr./qtr x minimum 8 terms) [7]	24
Total Hours		**69**

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. Immunology M.D.-Ph.D. students may fulfill this requirement by taking IMM 6863 Current Topics in Immunology twice for credit and MDPH 5300 MD-PhD Conference twice for credit.
5. Ph.D. students may take any core courses approved for graduate credit as electives.
6. MD-PhD students are only required to take 4 elective credits from upper-level courses; these are often MD-PhD program required courses. Any group of courses offered by MCGSBS can be used to fulfill this requirement; however, students are expected to choose courses that complement their thesis work and careers. Also, the plans for elective coursework must be approved by the IMM graduate program director. In addition, before completion of the program, all students are encouraged to attend the one week long summer course in advanced immunology sponsored by the American Association of Immunologists.
7. Must enroll every quarter once a thesis laboratory is selected for remainder of program. Directed research projects under the supervision of a faculty mentor.

Qualifying Exams and Thesis Research

By the end of the first year of the program, each student is expected to select a laboratory and thesis mentor. At the beginning of the second year, all students take a written and oral qualifying exam. The written exam precedes the oral exam and is administered over two consecutive half-day sessions. This exam covers fundamental immunology, including the material taught in the core immunology course and the six required immunology tutorials. The exam is prepared and graded by the faculty responsible for teaching the courses.

All students are strongly encouraged to schedule and take the IMM oral qualifying exam 8 weeks after the written qualifying exam. All students must take and satisfactorily pass the oral qualifying exam no later than October 31 of the third year. Immunology Track students are required to have five faculty members on their exam committee, the composition of which will be determined by the Immunology Program Director with input from the student and the mentor. The student and mentor may choose two examiners, and the Immunology Program Director, drawing from a designated pool of examiners, will choose the remaining three.

A written thesis proposal, presentation, and Thesis Advisory Committee (TAC) discussion of the proposal must be completed by the middle of the student's third year. Immunology Track degree candidates, however, are strongly encouraged to complete this requirement within two months of successfully passing the oral qualifying exam. The student should work with the lab mentor to prepare a 6-7 page written thesis proposal (single-spaced, ½ inch margins on all sides, Arial 11 font; references are required but are not included in the 6-7 page limit) in the format of an F31/F30 NIH fellowship grant. Students who have taken MGS 5050 are taught how to write such a document during the course. All students are expected to prepare the thesis proposal by working closely with their lab mentor. The composition of the TAC will be determined by the mentor with input from the student and must be approved by the Immunology Program Director and MCGSBS. The TAC must consist of a minimum of five faculty members; three members must have full privileges.

Suggested Sequence

This is a suggested 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 6000	Responsible Conduct of Research	1
MGS 5102	Ph.D. Laboratory Rotation	2
IMM 5200	Introduction to Flow Cytometry [1]	1
CTSC 5590	Foundations of Statistics in Clinical and Translational Research [2]	1

Code	Title	Hours
First Year - Fall Term		
MGS 5107	Ph.D. Laboratory Rotation	2
MGS 5108	Ph.D. Laboratory Rotation	2
IMM 5100	Basic Graduate Immunology	3

Code	Title	Hours
First Year - Winter Term		
IMM 6885	Tutorial in Generation and Function of B Cells	2
IMM 6884	Tutorial in Generation and Function of T Cells	2
IMM 6878	Tutorial in Innate Immunity	2
IMM 6882	Tutorial in Bridging Innate and Adaptive Immunity	2
IMM 6867	Colloquium in Research [1]	1
CTSC 5600	Introduction to Statistics in Clinical and Translational Research [2]	3
MGS 6890	Predoctoral Research [3]	3

Code	Title	Hours
First Year - Spring Term		
IMM 6879	Tutorial in Adaptive Immunity	2
IMM 6880	Tutorial in Tissue Immunity	2
MGS 6890	Predoctoral Research	3
IMM 6863	Current Topics in Immunology [1]	1

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

Code	Title	Hours
Second Year - Fall Term		
MGS 6890	Predoctoral Research	3
MGS 5051	Critical Thinking and Scientific Writing, Part II	1
IMM 6863	Current Topics in Immunology [1]	1

Code	Title	Hours
Second Year - Winter Term		
MGS 6890	Predoctoral Research	3
IMM 6885	Tutorial in Generation and Function of B Cells	2
IMM 6884	Tutorial in Generation and Function of T Cells	2
IMM 6878	Tutorial in Innate Immunity	2
IMM 6882	Tutorial in Bridging Innate and Adaptive Immunity (Odd Years)	2
IMM 6867	Colloquium in Research [1]	1

Code	Title	Hours
Second Year - Spring Term		
MGS 6890	Predoctoral Research	3
IMM 6879	Tutorial in Adaptive Immunity (Even Years)	2
IMM 6880	Tutorial in Tissue Immunity (Odd Years)	2
IMM 6865	Regenerative T Cell Immunotherapy and Cellular Engineering [1]	3

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

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

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

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

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

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

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

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

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 IMM Elective
2 A minimum of 1 credit of statistics courses are required. See program requirements for course options and details.
3 Once mentor is selected.