

Immunology, PhD

Learning Outcomes

Students will:

- develop the ability to think critically and work collaboratively;
- develop the ability to evaluate data and scientific literature;
- develop the ability to problem solve, expand technical skills, and design rigorous and reproducible experiments;
- develop the ability to communicate their scientific findings and knowledge via both written and oral methods to a variety of audiences; and
- prepare for independent careers as leaders, investigators, and educators in cutting-edge research, teaching, and service in basic and applied immunology.

Requirements

The Doctor of Philosophy in immunology requires 72 s.h. of graduate credit. Students must maintain a cumulative grade-point average of at least 3.00 to earn the degree. The program provides interdisciplinary training in the concepts and methodologies of basic and applied immunology.

Students complete coursework in immunology and related disciplines, and are directly involved in laboratory research throughout their study. Immunology graduate courses are offered not only to teach students the current concepts and paradigms within the field, but to emphasize the scientific approaches and methods used to attain this understanding.

The PhD in immunology requires the following coursework.

Core Curriculum

Course #	Title	Hours
IMMU:6201/ MICR:6201	Graduate Immunology	3
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6221	Rigor and Reproducibility in Immunology	1
IMMU:6231	Research in Immunology	arr.
IMMU:6241	Writing a Scientific Proposal	2
IMMU:6247/ MICR:6247	Graduate Immunology and Human Disease	4
IMMU:7221/ MICR:7207	Advanced Topics in Immunology	3
BMED:5207	Principles of Molecular and Cellular Biology	3
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I	0
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II	0
PCOL:5204	Basic Biostatistics and Experimental Design	1
Elective		3

Typical Curriculum

First Year, Fall

Course #	Title	Hours
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	arr.
IMMU:6247/ MICR:6247	Graduate Immunology and Human Disease	4
BMED:5207	Principles of Molecular and Cellular Biology	3
PCOL:5204	Basic Biostatistics and Experimental Design	1

First Year, Spring

Course #	Title	Hours
IMMU:6201/ MICR:6201	Graduate Immunology	3
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	arr.
Elective (optional)		1-3

Second Year, Fall

Course #	Title	Hours
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6221	Rigor and Reproducibility in Immunology	1
IMMU:6231	Research in Immunology	arr.
IMMU:6241	Writing a Scientific Proposal	2
IMMU:7221/ MICR:7207	Advanced Topics in Immunology	3
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I	0
Elective (optional)		1-3

Second Year, Spring

Course #	Title	Hours
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	arr.
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II	0
Elective (optional)		1-3

Electives

The following are possible elective choices.

Course #	Title	Hours
ACB:5218/ BIOL:5218/ MICR:5218	Microscopy for Biomedical Research	3
BIOS:4120	Introduction to Biostatistics	3
BMB:7251	Introduction to Protein Structures	1
BMB:7252	Enzymes, Carbohydrates, Nucleic Acids, Lipids, and Membranes	1

BMB:7253	Introduction to Metabolism	1
BMB:7254	Metabolism I	1
BMB:7255	Metabolism II	1
BMB:7256	Molecular Biology	1
MICR:6259	Graduate Bacteria and Human Disease	4
MICR:6267	Graduate Viruses and Human Disease	3
MICR:6268	Biology and Pathogenesis of Viruses	2
MICR:6270	Graduate Bacterial Genetics	3
MMED:6220/ ACB:6220/ MPB:6220	Mechanisms of Cellular Organization	3
MMED:6226/ ACB:6226/ MPB:6226	Cell Cycle Control	1
MMED:6227/ ACB:6227/ MPB:6227	Cell Fate Decisions	1
PATH:5270/ IGPI:5270/ MMED:5270	Pathogenesis of Major Human Diseases	3
PCOL:6207	Ion Channel Pharmacology	1
PCOL:6225	Growth Factor Receptor Signaling	1

Additional Requirements

Laboratory Rotations

Prior to selecting a laboratory for dissertation work, students are expected to perform three laboratory rotations, with each rotation lasting approximately 12 weeks in duration. During the first semester, students should become acquainted with the research interests of the faculty members in the immunology program. This learning process is facilitated by faculty presentations in IMMU:6211 Immunology Graduate Student Seminar during the fall semester. Students are also encouraged to meet with specific faculty to discuss their research programs. This enables students to make an informed decision about their laboratory rotations, with the guidance and approval of their advisor and the graduate studies committee.

At the latest, students should begin their first rotation within the first week of graduate study. Medical Science Training Program (MSTP) students who have completed rotations in immunology program laboratories before joining the program are excused from further rotations if joining that immunology laboratory. Students with MS degrees that include a research-based dissertation may be excused from one rotation.

Rotations are graded either satisfactory or unsatisfactory. This grade is based upon a number of criteria including attendance and work habits. When not in classes or seminars, students are expected to spend the remaining portion of the day in the laboratory. Without a strong commitment to the rotation project, it is difficult to fulfill the purpose and aims of the rotation. A satisfactory grade is required in each of the laboratory rotations. If a satisfactory grade is not received in one of the rotations, an additional rotation is assigned. Failure to receive a satisfactory grade in the extra rotation results in the student being placed on academic probation. Following each rotation, an evaluation is given to each student

by the faculty member and submitted to the graduate studies committee.

Teaching

Students complete a teaching requirement lasting one semester. A variety of courses are available in several departments, and the program leadership place students in courses based upon interest, expertise, and scheduling.

Publication Requirements

It is expected that the dissertation project be of sufficient breadth, depth, and novelty to result in first-author research publications in high-quality peer-reviewed journals. A minimum of one peer-reviewed paper must be published or in press prior to the completion of the PhD. In addition, a second publication, in which the student is a coauthor on a peer-reviewed article, a review, or book chapter must be published or in press prior to the completion of the degree. Students are not permitted to schedule a dissertation defense until it has been demonstrated that both of these requirements have been met.

Comprehensive Examination

The comprehensive examination is generally taken in the spring semester of the second year of study. MSTP students who joined their dissertation laboratory at the beginning of the first year of graduate study and students entering the program with an MS degree may begin the comprehensive exam process in September of the second year of graduate study.

Students taking the comprehensive examination prepare a single abstract of an original research proposal. The examination committee determines if the abstract topic is appropriate as nonoverlapping in major approach or topic with the student's dissertation research and if the abstract is scientifically sound to potentially serve as the basis for a defensible research proposal. After the abstract is accepted, students are given four weeks to complete and submit the written comprehensive examination proposal. The oral defense is scheduled 14–21 days after the proposal is accepted by the committee, depending on the availability of the committee members. The written portion of the comprehensive exam is written in the form of an NIH-style pilot grant proposal based on the abstract and instructions from the comprehensive examination. A detailed student handbook is available on the Interdisciplinary Graduate Program in Immunology website.

Final Examination

The five members of the thesis committee serve as an advisory body for the preparation of the thesis. The committee meets with each student to review the material that they expect to be incorporated into the thesis. Although meetings with the committee should be yearly, the candidate, thesis advisor, or the committee can request a meeting at any time. A final draft of the thesis must be given to all members of the committee a minimum of two weeks before the final examination.

The final examination takes the form of a seminar presented to the program. This presentation is announced according to Graduate College policy. Questions, comments, and discussion follow. After the seminar, the candidate meets with the committee for the final thesis defense. In some cases revisions may be required. The degree is not awarded until the thesis is signed.

Combined Programs

PhD/MD

Students may work toward the Doctor of Medicine degree and a PhD in immunology in a combined degree program offered by the Graduate College and the Carver College of Medicine. Applicants must be admitted to both programs before they may be admitted to the combined degree program. See the Medical Scientist Training Program (Carver College of Medicine) in the catalog.

Admission

For information regarding admission and application procedures, visit the Interdisciplinary Graduate Program in Immunology website.

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

Academic Plans

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Immunology, PhD

Course	Title	Hours
Academic Career		
Any Semester		
72 s.h. must be graduate level coursework; graduate transfer credits allowed upon approval. More information is included in the General Catalog and on department website. ^a		
Graduate College program GPA of at least 3.00 is required. ^b		
Hours		0
First Year		
Fall		
BMED:5207	Principles of Molecular and Cellular Biology	3
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	6
IMMU:6247	Graduate Immunology and Human Disease	4
PCOL:5204	Basic Biostatistics and Experimental Design	1
Hours		15
Spring		
IMMU:6201	Graduate Immunology	3
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	8
Elective course ^c		3
Hours		15

Second Year

Any Semester

Elective course (at least 3 s.h. if needed) ^c		
Hours		0
Fall		
BMED:7270	Scholarly Integrity/Responsible Conduct of Research I	0
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6221	Rigor and Reproducibility in Immunology	1
IMMU:6231	Research in Immunology	8
IMMU:6241	Writing a Scientific Proposal	2
IMMU:7221	Advanced Topics in Immunology	3
Hours		15

Spring

Exam: Doctoral Comprehensive Exam		
BMED:7271	Scholarly Integrity/Responsible Conduct of Research II	0
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	14
Hours		15

Third Year

Fall		
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	1
Hours		2

Spring

IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	1
Hours		2

Fourth Year

Fall		
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	1
Hours		2

Spring

IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	1
Hours		2

Fifth Year

Fall		
IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	1
Hours		2

Spring

IMMU:6211	Immunology Graduate Student Seminar	1
IMMU:6231	Research in Immunology	1

Exam: Doctoral Final Exam^d

Hours	2
Total Hours	72

- a Students must complete specific requirements in the University of Iowa Graduate College after program admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.
- b Graduate College program GPA is comprised of all courses that are approved degree requirements. If a student takes more than the minimum required number of semester hours to complete the degree, but all courses taken are eligible to count toward the degree, those courses will be included in the Graduate College program GPA.
- c Work with faculty advisor to determine appropriate graduate elective coursework and sequence.
- d Program seminar followed by the dissertation defense.