

Ph.D. Program in Immunology and Microbial Pathogenesis

Program Requirements

Required Core Courses

| | | Credits |
|------------------------|--|----------|
| IMP 505A | Fundamentals of Immunology, Part 1 | 2 |
| IMP 505B | Fundamentals of Immunology, Part 2 | 2 |
| IMP 600 | Microbiology | 2 |
| IMP 601, 610, 620, 630 | Research Rotation (3 usually required) | 3 each |
| IMP 910, 920, 930 | Dissertation Research | Variable |
| GC 550 | Foundations in Biomedical Sciences | 10 |

Required Advanced Course in IMP:

(Offered in even years, '06, '08, etc.)

| | | |
|---------|---|---|
| IMP 631 | Advanced Cellular Immunology | 3 |
| IMP 685 | Advanced Topics in Virology & Neurovirology | 3 |

Offered in odd years, '05, '07, etc.)

| | | |
|---------|---|---|
| IMP 623 | Immunopathology | 3 |
| IMP 632 | Molecular Immunology | 3 |
| IMP 655 | Advanced Topics in Microbial Pathogenesis | 3 |

Other Required Courses:

| | | |
|-------------------|--|--------|
| IMP 712, 722, 732 | Current Literature I, II, III | 1 each |
| GC 640 | Research Ethics: The Responsible Conduct of Research | 1 |
| GC 660 | Statistical Methods | 3 |
| GC 730 | Planning & Writing Research Grants | 1 |

Recommended Elective Courses

| | | |
|--------|--|---|
| BI 535 | Biochemistry and Molecular Biology – Metabolism | 3 |
| CB 615 | Developmental Biology and Teratology I: Embryology | 3 |
| CB 625 | Mechanisms of Development | 3 |
| GC 633 | Topics in Bioinformatics | 3 |
| GE 612 | Genetics of Model Organisms | 3 |
| GE 636 | Regulation of Cell Cycle & Apoptosis | 3 |
| GE 637 | Advanced Human Genetics | 3 |
| GE 651 | Pathobiology of Cancer | 3 |
| GE 652 | Molecular Basis of Cancer | 2 |
| NS 700 | Introduction to Neuroscience | 4 |
| NS 715 | Cell and Molecular Neuroscience | 3 |
| PR 680 | Molecular Pharmacology | 3 |

Other Courses with approval of advisor

Course Descriptions

IMP 505 A and B Fundamentals of Immunology (Sykulev)

Credits 4 Part A may be taken independently for 2 credits

Spring I

A comprehensive course encompassing the major areas of Immunology: Part A: innate immunity, immune receptor diversity; antigen processing and presentation; T and B cells. Part B: immune tolerance, microbial immunity; transplantation; tumor immunology. The format will involve both lecture and discussion of specific topics, and students will be encouraged to acquire an understanding of classical and modern immunological concepts through analysis of their experimental bases. Discussion of critical techniques in Immunology will be incorporated throughout the course. Assigned reading.

IMP 530 Infection and Immunity (Hooper)

Credits 3

Prerequisite: IMP 505 A and B or equivalent

Spring II

This course provides students with an introduction to the field of microbial immunology. Lectures will focus on immune responses to infectious agents; how pathogenic organisms evade immune-mediated elimination; how immunization protects against infection. Organisms ranging from viruses through bacteria to protozoa, helminths, and arthropods will be studied.

IMP 600 Microbiology (Alugupalli)

Credits 2

Spring I

This course provides students with an introduction to the field of Microbiology. Lectures will focus on particular infectious agents and will discuss pathogenesis, immunology, physiology, cell biology, pharmacology, and molecular biology of these organisms.

IMP 601, 610, 620, 630 Research Rotation in Immunology Pre-entry, I, II, III (Faculty)

Credits 3

Each semester/session; must complete 3 rotations

Students spend time in laboratories of program faculty, discussing the ongoing research projects and conducting experiments. Students are encouraged to read the background literature for the research area and to begin to develop approaches to the problem. These rotations are a prelude to selection of a research advisor.

IMP 623 Immunopathology (Hooper)

Credits 3

Prerequisite: GC 550, IMP 505, IMP 600 are required or permission of instructor

Spring II in odd years only

An advanced course that addresses the role of immunity in two major classes of diseases, autoimmunity and cancer. Course content will cover the immune mechanisms that cause cell damage and then study how these mechanisms function in autoimmunity and tumor immunity. A major objective is to assess the long-held but largely incorrect perceptions that autoimmunity is a consequence of the anomalous recognition of self-antigens and cancer is the failure to recognize altered self-antigens.

IMP 910, 920, 930**Dissertation Research (Faculty)**

Credits variable

Fall, Spring, Summer

Under the supervision of a member of the graduate faculty and guidance of a thesis research committee, the student will learn research design, methodology, and experimental techniques relevant to the graduate program. Research leading to the doctoral thesis is a major requirement for the Ph.D. degree and will occupy a dominant part of the student's time and attention.

GC 550**Foundations of Biomedical Sciences (Ellingson)**

Credits 10

Fall

This course is designed to provide a basic knowledge of biochemistry, genetics, molecular biology and cellular biology to the beginning student. The primary goal is to convey knowledge of the molecular and cellular mechanisms controlling cell, tissue and organ system function using material drawn from biochemistry, cell biology, genetics, pharmacology and physiology. The course will familiarize the student with the powerful technologies used in scientific research and will train the student in the communication of science through informal sessions on evaluation of published literature, scientific writing, oral presentations, and information retrieval.

GC 640**Research Ethics: The Responsible Conduct of Research (Flynn)**

Credits 1

Fall, Spring I

This graduate seminar course is designed to familiarize students with the ethical dilemmas inherent to the conduct of research. Topics to be discussed include codes of ethical behavior, research design, conflicts of interest, informed consent and the appropriate use of animals. The student will be required to prepare a paper on the analysis of one or more case studies.

GC 660**Statistical Methods of Data Analysis (Diamond, Winter, Crawford)**

Credits 3

Fall, Spring I, Spring II

Students learn to apply the principles and techniques of basic statistical analysis, including descriptive and inferential statistics. Applications using the normal, t and chi-square distributions are emphasized. The SAS software package for analysis is included.

GC 730**Planning & Writing Research Grants (Grunwald)**

Credits 1

Spring II

This course is designed to provide students with instruction and practical experience in the art of planning and writing a research grant proposal. Students will become familiar with the structure of a research grant, including the development of the major sections of a grant proposal such as specific aims, background and significance, and experimental design. Development of the experimental design section will include approaches to discussion of experimental rationale, detailed research methods, expected results and interpretations, and potential pitfalls and alternatives. Students will also learn about the peer review process and how to critique a grant proposal. NIH-style grants will serve as the model for this course, although the general principles of grant organization and writing will be applicable to all research grants. Students will gain practical experience by sequential production of three written documents: (1) an NIH-style Specific Aims Page, (2) a Research Plan based upon expansion and development of one specific aim, and (3) an NIH-style critique of a grant proposal.

Course Check List

| | Fall | Spring 1 | Spring 2 | Summer |
|---------------|-------------------------------------|--|---|------------------------|
| | 20 credit total | 30 credit total | | 10 credit total |
| Year 1 | GC 550 10 credits | Introduction to Immunology IMP 505 A and B 2 credits each | Advanced Topics in Microbiology 1 or 2 3 credits | Research IMP 930 |
| | | | Advanced Topics in Immunology 1 or 2 IMP 631 or IMP 632 3 credits | |
| | Journal Club IMP 712 1 credit | Journal Club IMP 722 1 credit | Journal Club IMP 732 1 credit | |
| | Lab Rotation 1 IMP 610 3 credits | Lab Rotation 2 IMP 620 3 credits | Lab Rotation 3 IMP 630 3 credits | |
| | | Ethics / Statistics / Writing GC 640 / GC 660 / GC 730 1 credit / 3 credits / 1 credit | | |
| | Research IMP 910 | Research IMP 920 | | |
| Year 2 | Elective 1 | Elective 2 | Advanced Topics in Microbiology 1 or 2 3 credits | Research IMP 930 |
| | | | Advanced Topics in Immunology 1 or 2 IMP 631 or IMP 632 3 credits | |
| | Journal Club IMP 712 1 credit | Journal Club IMP 722 1 credit | Journal Club IMP 732 1 credit | |
| | Research IMP 910 | Research IMP 920 | | |
| Year 3 | Research IMP 910 | Research IMP 920 | | Research IMP 930 |
| | Journal Club IMP 712 1 credit | Journal Club IMP 722 1 credit | Journal Club IMP 732 1 credit | |
| | Preliminary Examination | | | |

Notes:

Full time registration is always 20 credits Fall, 30 credits Spring 1 and Spring 2, 10 credits Summer

54 course credits are required (does not include research); 18 of these credits must be from outside IMP

You may stop registering for Journal Club once you have completed the 54 course credits, but you must continue to attend journal club each semester (Fall, Spring 1, and Spring 2).