Committee on Immunology

Chair
- Alexander Chervonsky

Professors
- Erin Adams, Biochemistry and Molecular Biology
- Maria Luisa Alegre, Medicine
- Albert Bendelac, Pathology
- Eugene Chang, Medicine
- Alexander Chervonsky, Pathology
- Anita Chong, Surgery
- Marcus Clark, Medicine
- Aaron Dinner, Chemistry
- Yang Xin Fu, Pathology
- Thomas Gajewski, Pathology and Medicine
- Yoav Gilad, Human Genetics
- Tatyana Golovkina, Microbiology
- Bana Jabri, Medicine
- Vinay Kumar, Pathology
- Rima McLeod, Surgery
- Cathryn Nagler, Pathology
- Anthony Reder, Neurology
- Raymond Roos, Neurology
- Hans Schreiber, Pathology
- Jerrold Turner, Pathology
- Martin Weigert, Pathology

Associate Professors
- Juliane Bubeck Wardenburg, Pediatrics
- Fotini Gounari, Medicine
- Haochu Huang, Medicine
- Barbara Kee, Pathology
- Avertano Noronha, Neurology
- Glenn Randall, Microbiology
- Anne I. Sperling, Medicine
- Patrick Wilson, Medicine

Assistant Professors
- Kenneth Cohen, Medicine
- Jill De Jong, Pediatrics
- Justin Kline, Medicine
Committee on Immunology offers a graduate program of study leading to the Doctor of Philosophy degree in Immunology. The committee is dedicated to the open exchange of ideas among scholars of all fields, a commitment enhanced by an organizational structure that completely integrates the basic biological sciences with the clinical sciences. This multidisciplinary and integrated approach corresponds well with the reality of the new biology, where molecular and structural techniques are applied widely and with great success to clinical problems.

The Committee on Immunology is a member of the Biomedical Sciences Cluster, which also includes graduate programs from the Committee on Cancer Biology, Committee on Microbiology, the Committee on Molecular Metabolism and Nutrition, and the Department of Pathology’s Molecular Pathogenesis and Molecular Medicine Graduate Program. The five academic units share several common courses, a seminar series and additional common events for students and faculty within the cluster. The goal of the cluster system is to encourage interdisciplinary interactions among both trainees and faculty, and to allow students flexibility in designing their particular course of study.

In addition to formal course work, the Committee on Immunology sponsors a weekly seminar series, an annual retreat where students and faculty present their research, and several focused group meetings.

ADMISSION

Prospective students interested in obtaining the Ph.D. in Immunology should submit an application to the Biological Sciences Division by December 1st of each year; indicate their cluster of interest as Biomedical Sciences and select Immunology as their proposed degree program.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Ph.D. requirements include:

- Completion of 9 course credits consisting of basic science, immunology and elective courses.
- A preliminary examination.
- A dissertation based on original research.
- A final thesis examination.
IMMUNOLOGY COURSES

IMMU 30010. Immunopathology. 100 Units.
Five examples of diseases are selected each year among the following categories: autoimmune diseases, inflammatory bowel diseases, infection immunity, immunodeficiencies and gene therapy, and transplantation and tumor immunology. Each disease is studied in depth with general lectures that include, where applicable, histological analysis of diseased tissue samples and discussions of primary research papers on experimental disease models. Special emphasis is placed on understanding immunopathology within the framework of general immunological concepts and on experimental approaches to the study of immunopathological models.
Instructor(s): B. Jabri Terms Offered: Winter
Prerequisite(s): Consent of instructor
Equivalent Course(s): BIOS 25258, PATH 30010

IMMU 31200. Host Pathogen Interactions. 100 Units.
This course will explore the basic principals of host defense against pathogens and pathogens’ strategies to overcome host immune mechanisms. The course will address evolutionary aspects of innate and adaptive immune responses, while also studying specific examples of viral and bacterial interactions with their hosts. The reviews of relevant immunological mechanisms necessary for appreciation of host/pathogen interactions will be incorporated in the studies of specific cases. This course explores the basic principles of host defense against pathogens, including evolutionary aspects of innate and adaptive immunity and immune evasion strategies. Specific examples of viral and bacterial interactions with their hosts are studied in depth. A review of immunological mechanisms involved in specific cases is incorporated in the course.
Instructor(s): A. Chervonsky Terms Offered: Autumn
Equivalent Course(s): MICR 31200

IMMU 31500. Advanced Immunology 1. 100 Units.
This course explores the basic principles of the immune system, including tolerance, the development and differentiation of lymphocyte subsets, the regulation of the class of immune responses, memory, cell homing and migration, cell-cell interactions, antigen presentation and recognition.
Instructor(s): A. Bendelac Terms Offered: Winter

IMMU 32000. Advanced Immunology 2. 100 Units.
This class will explore the molecular and biochemical mechanisms by which lymphocytes develop and are activated in response to antigen. This will include the signal transduction pathways and transcriptional networks involved in these processes, as well as the molecular mechanisms underlying the generation of receptor diversity.
Instructor(s): B. Kee Terms Offered: Spring
IMMU 37000. Mucosal Immunology. 100 Units.
This course addresses how the gut associated lymphoid tissue distinguishes innocuous dietary antigens and commensal bacteria from pathogenic microbes and mounts an appropriate response. The realization that we live in a dynamic relationship with the trillions of bacteria that form the commensal microbiome has added additional complexity to our understanding of this conundrum. In this course a topic will be introduced with a lecture and review article for the first class of each week. In the second class each week students will lead the discussion of the primary articles assigned. The course will be graded on class participation and a final essay-based exam. Although intended primarily for graduate students in the Immunology, Microbiology, MPMM and CMMN programs, undergraduates may enroll with the permission of the instructor.
Instructor(s): C. Nagler Terms Offered: Spring. Offered in even years
Prerequisite(s): An introductory course in immunology is required.
Equivalent Course(s): BIOS 25267

IMMU 40200. Experimental Immunology. 050 Units.
This course centers around the Immunology Journal Club and the Immunology Seminar Series and has two purposes. The first is to provide background knowledge for the seminar given each week by an outside speaker or a member of the Committee on Immunology. The second is to allow the students an opportunity to develop skills in analyzing the literature with students at the same stage of training. First and second year students are required to participate in this course. The two-year course counts towards one credit.
Instructor(s): Staff Terms Offered: Autumn, Winter, Spring

IMMU 47300. Genomics and Systems Biology. 100 Units.
This lecture course explores the technologies that enable high-throughput collection of genomic-scale data, including sequencing, genotyping, gene expression profiling, assays of copy number variation, protein expression and protein-protein interaction. We also cover study design and statistical analysis of large data sets, as well as how data from different sources can be used to understand regulatory networks (i.e., systems). Statistical tools introduced include linear models, likelihood-based inference, supervised and unsupervised learning techniques, methods for assessing quality of data, hidden Markov models, and controlling for false discovery rates in large data sets. Readings are drawn from the primary literature.
Instructor(s): Y. Gilad Terms Offered: Spring
Prerequisite(s): STAT 23400 or Statistics in the Biomath Sequence
Equivalent Course(s): HGEN 47300, BIOS 28407