

# COMMITTEE ON MICROBIOLOGY

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## Chair

- Glenn Randall, Microbiology

## Professors

- Eugene B. Chang, Medicine
- Alexander Chervonsky, Pathology
- Laurie Comstock, Microbiology
- Tatyana Golovkina, Microbiology
- Jean Greenberg, Molecular Genetics & Cell Biology
- Shabaana Khader, Microbiology
- Dominique Missiakas, Microbiology
- Eric Pamer, Medicine
- Tao Pan, Biochemistry & Molecular Biology
- Glenn Randall, Microbiology
- Phoebe Rice, Biochemistry & Molecular Biology
- Raymond Roos, Neurology
- Lucia Rothman-Denes, Molecular Genetics & Cell Biology
- Michael Rust, Molecular Genetics & Cell Biology
- Wei Jen Tang, Ben May Department for Cancer Research
- Savas Tay, Pritzker School of Molecular Engineering
- Aaron Turkewitz, Molecular Genetics & Cell Biology

## Associate Professors

- Ran Blekhman, Medicine
- Maureen Coleman, Geophysical Sciences
- Jacob Waldbauer, Geophysical Sciences

## Assistant Professors

- Jueqi Chen, Microbiology
- Daria Esterhazy, Pathology
- Erin Green, Microbiology
- Mohammed Kaplan, Microbiology
- Sam Light, Microbiology
- Mark Mimee, Microbiology
- Sampriiti Mukherjee, Molecular Genetics and Cell Biology
- Arjun Raman, Pathology

## Emeritus Faculty

- Robert Haselkorn, Molecular Genetics & Cell Biology
- Bernard Roizman, Microbiology
- Howard Shuman, Microbiology

The primary purpose of the Committee on Microbiology is to produce research scientists and teachers in microbiology by offering formal instruction; by fostering informal dissemination of information among the faculty, fellows and students engaged in research in microbiology; and by administering a program of study leading to the degree of Doctor of Philosophy. Through its faculty, activities and educational program, the Committee on Microbiology integrates studies in various clinical and non-clinical departments of the Biological Sciences Division. The Committee on Microbiology maintains maximum flexibility in its program to cater to students' developing interests. Students with backgrounds in any appropriate field (physics, chemistry, biology, biochemistry, and medicine) may commence work in microbiology upon entering the graduate program of the Biological Sciences Division. The Committee on Microbiology sponsors a seminar series, which brings to campus prominent microbiologists from all over the world to discuss their research and meet with microbiology faculty and students. Another regular activity sponsored by the committee is the Microbiology Research Forum. Research Forums feature a current graduate student, postdoctoral fellow or other training fellow in microbiology

presenting his/her research data. Microbiology Research Forums are open to the university community, offering an informal forum for the discussion of microbiology within the Chicago scientific community.

The Committee on Microbiology is a member of the Biomedical Sciences Cluster, which also houses graduate programs of the Committee on Cancer Biology, the Committee on Immunology, and the Committee on Molecular Metabolism and Nutrition. The four academic units share several courses, a seminar series and other 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. The Ph.D. degree is administered by the Committee on Microbiology and is recommended when the student has fulfilled the requirements stipulated in his or her individual program; has met the divisional requirements for the degree; and, in the opinion of the committee, has attained competence in research in his or her field of specialization.

## MICROBIOLOGY COURSES

### **MICR 30600. Fundamentals of Bacteria. 100 Units.**

This course meets one of the requirements of the microbiology specialization. This course introduces bacterial diversity, metabolism, ultra-structure, envelope assembly, genetics, bacterial communities, interbacterial interactions, and symbioses. In the discussion section, students review recent original experimental work in the field of bacteriology.

Instructor(s): L. Comstock Terms Offered: Autumn

Prerequisite(s): Three quarters of a Biological Sciences Fundamentals Sequence, or consent of instructor

Note(s): GP.

Equivalent Course(s): BIOS 25206

### **MICR 31100. Ethics in Scientific Research. 50 Units.**

TBD

Terms Offered: Winter

Equivalent Course(s): IMMU 31100, CABI 31100, MOMN 31100, MPMM 31100

### **MICR 31200. Host Pathogen Interactions. 100 Units.**

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

Prerequisite(s): BIOS 25206 and BIOS 25256

Note(s): GP.

Equivalent Course(s): BIOS 25260, IMMU 31200

### **MICR 31600. Molecular Basis of Bacterial Disease. 100 Units.**

This course meets one of the requirements of the microbiology specialization. This lecture/discussion course involves a comprehensive analysis of bacterial pathogens, the diseases that they cause, and the molecular mechanisms involved during pathogenesis. Students discuss recent original experimental work in the field of bacterial pathogenesis.

Instructor(s): J. Chen Terms Offered: Winter

Prerequisite(s): Three quarters of a Biological Sciences Fundamentals Sequence.

Note(s): GP.

Equivalent Course(s): BIOS 25216

### **MICR 34101. Molecular Genetics and Cell Biology of Prokaryotes. 100 Units.**

Prokaryotic life is extremely diverse and distinguished by unique molecular and genetic properties. This graduate-level course will explore the molecular basis of prokaryotic life in a hybrid lecture/discussion-based format. Students will be expected to read and discuss primary scientific papers that provide historical and functional insight into fundamental features of prokaryotic cell biology, metabolism and physiology.

Instructor(s): S. Mukherjee, S. Light Terms Offered: Spring

### **MICR 34600. Introduction to Virology. 100 Units.**

This class on animal viruses considers the major families of the viral kingdom with an emphasis on the molecular aspects of genome expression and virus-host interactions. Our goal is to provide students with solid appreciation of basic knowledge, as well as instruction on the frontiers of virus research.

Instructor(s): T. Golovkina Terms Offered: Spring

Prerequisite(s): Three quarters of a Biological Sciences Fundamentals Sequence and third- or fourth-year standing

Note(s): GP.

Equivalent Course(s): BIOS 25287

### **MICR 35910. PE: Medical Microbiology. 75-150 Units.**

TBA

### **MICR 38000. Fundamentals and Applications of the Human Microbiota. 100 Units.**

Thousands of microbes colonize the human body to collectively establish the human microbiota. Research findings over the past two decades have led to a growing appreciation of the importance of the microbiota in

various facets of human health. This course will explore the human microbiota through a critical review of the primary scientific literature. The first portion of the course will cover distinct ways by which the human microbiota impacts mammalian health. The second part of the course will focus on established and developing microbiota-targeting biotechnologies. Students will leave the course with a general understanding of the current state of human microbiota research and its therapeutic and diagnostic applications.

Instructor(s): S. Light, M. Mimee Terms Offered: Winter

Prerequisite(s): Three quarters of a Biological Sciences Fundamentals Sequence. Third or fourth year standing or consent of instructor.

Note(s): GP.

Equivalent Course(s): MENG 23210, BIOS 25207, MENG 33210

**MICR 39000. Introduction to Experimental Microbiology. 100 Units.**

The Committee on Microbiology will host a seminar series comprised of seven to ten presentations by faculty invited from other institutions. A reading and discussion session will accompany the seminar series. In the session, which meets for one hour on a day preceding each week's seminar, first year graduate students will discuss with their peers and a Microbiology faculty member three original research papers of the invited speaker. Following the seminar and the conventional question and answer period, first year graduate students of the Committee on Microbiology are invited to question the speaker on her or his research and to discuss their own research for a period of 1 hour. In this manner, we will provide students with an intellectual environment that reveals the discovery process and research frontiers in various laboratories and fields. First year graduate students are required to register for the course.

Instructor(s): G. Randall Terms Offered: Autumn Spring Winter

**MICR 39200. Tutorial: Microbiology. 100 Units.**

Additional readings in an area of Microbiology. Must be prearranged with a faculty member and preapproved by the chair of the Curriculum Committee.

Instructor(s): G. Randall Terms Offered: Autumn Spring Summer Winter

**MICR 39500. UChicago Microscopy Course. 100 Units.**

The UChicago Microscopy Course is a residential research course hosted at the Marine Biological Laboratory in Woods Hole, MA. The course is designed for graduate students in year two or beyond. Travel and lodging costs will be covered in full. This intensive two-week boot camp course will teach both conceptual foundations and practical approaches to modern light microscopy, using a variety of microscopes and specimens. The central goal is to empower students to identify and master imaging strategies that are best suited to address their specific experimental problems of interest, now and in the future. Core topics will include: (a) fundamentals of microscope design, image formation, contrast, and resolution; (b) common approaches to transmitted light (e.g. phase contrast, DIC, and polarization) and fluorescence microscopy (e.g. laser scanning or spinning disk confocal, light sheet and TIRF), (c) fluorescent probes and multispectral imaging; and (d) cameras and detectors, signal: noise and strategies for optimal sampling in space and time. More advanced topics will include single-molecule approaches, super-resolution, and photokinetics (e.g. FRAP, photoactivation, and optogenetics). In the first half of the course, daily lectures will introduce basic concepts, followed by intensive hands-on experience with different specimens, microscopes, and imaging modalities. In the second half, students will explore more advanced topics of interest through a set of modular projects.

Instructor(s): Ed Munro, Rick Fehon, Abishek Kumar Terms Offered: Autumn

Equivalent Course(s): MGCB 39500, DVBI 39500, BCMB 39500

**MICR 39900. Readings: Microbiology. 100 Units.**

Reading course in an area of Microbiology of special interest to the student. Must be prearranged with a faculty member and preapproved by the chair of the Curriculum Committee.

Instructor(s): G. Randall Terms Offered: Autumn Spring Summer Winter

**MICR 40000. Microbiology Research Forum. 100 Units.**

All graduate students and honors undergraduate students of the Committee on Microbiology will present their research in a central forum, the data club, once each year. Students and postdoctoral fellows present their recent research data for critical evaluation by the faculty of the Committee on Microbiology. This course provides a forum to ensure continued progress of graduate students in their thesis projects. First year graduate students are required to register for the course.

Instructor(s): G. Randall Terms Offered: Autumn Spring Winter

**MICR 47000. Thesis Research: Microbiology. 300.00 Units.**

Laboratory research for senior graduate students.

Instructor(s): G. Randall Terms Offered: Autumn Spring Summer Winter

