Molecular Microbiology

Chair, Graduate Program
David R. Hendrixson, Ph.D.

Degree Offered
Doctor of Philosophy

Faculty

Professors
Michael Bennett
M.D., Baylor College of Medicine, 1961

Cheng-Ming Chiang
Ph.D., University of Rochester, 1991

Beatriz M.A. Fontura
Ph.D., New York University School of Medicine, 1996

Eric J. Hansen
Ph.D., University of Michigan, 1977

Jeffrey S. Kahn
M.D., Ph.D., State University of New York Health Science Center at Brooklyn, 1991

Nitin J. Karandikar
M.D., University of Pune, India, 1990; Ph.D., Northwestern University, 1997

Beth Levine
M.D., Cornell University Medical College, 1986

Michael V. Norgard
Ph.D., New Jersey Medical School, 1977

Vanessa Sperandio
Ph.D., State University of Campinas, Brazil, 1995

Iwona Stroynowski
Ph.D., Stanford University, 1979

Jonathan W. Uhr
M.D., New York University School of Medicine, 1952

Ellen S. Vitetta
Ph.D., New York University School of Medicine, 1968

Dorothy C. Yuan
Ph.D., UT Southwestern Medical Center, 1977

Associate Professors
Blount
Ph.D., Washington University School of Medicine, St. Louis, 1990

Marie-Alda Gilles-Gonzalez
Ph.D., Massachusetts Institute of Technology, 1988

David R. Hendrixson
Ph.D., Washington University School of Medicine, St. Louis, 1999

Lora V. Hooper
Ph.D., Washington University School of Medicine, St. Louis, 1997

Julie K. Pfeiffer
Ph.D., University of Michigan, 2001

Gürol Süel
Ph.D., UT Southwestern Medical Center, 2003

Nicola S.C. van Oers
Ph.D., McGill University, Canada, 1990

Assistant Professors
Neal M. Alto
Ph.D., Oregon Health & Science University, 2003

Ph.D., Johns Hopkins University, 2001

Ivan D’Orso
Ph.D., National University of San Martin, Argentina, 2003

David E. Greenberg
M.D., Baylor College of Medicine, 1999

Andrew Y. Koh
M.D., Harvard Medical School, 1996

Michael U. Shiloh
M.D., Cornell University Medical College, 2001

Nancy E. Street
Ph.D., UT Southwestern Medical Center, 1987

Nan Yan
Ph.D., UT Austin, 2006

Felix Varovinsky
M.D., Russian State Medical University, 2000

Objectives
The Molecular Microbiology Graduate Program emphasizes an integrated approach to the study of prokaryotic and eukaryotic organisms. A universal major research focus of many faculty members of the Molecular Microbiology Graduate Program is the study of medically relevant bacteria and viruses and the ways these pathogens interact with respective hosts to cause disease. For many research programs, interdisciplinary approaches are employed to analyze various interesting aspects of the biology of these important pathogens. Overall, this Program is dedicated to providing a superior level of training in biomedical research strategies and technologies related to the major principles of molecular microbiology.

The major emphases of studies in the Molecular Microbiology Graduate Program include:

- **microbial pathogenesis:** analysis of virulence and colonization factors, bacterial toxins, interactions of pathogens and their products with eukaryotic host cells, contemporary vaccine strategies, bacterial gene regulation, bacterial export and secretion, and genetic regulation of virulence gene expression.

- **virology:** viral replication and persistence, viral pathogenesis, neurovirology, host resistance to viral infection, viral vaccines, eukaryotic gene regulation, signal transduction pathways, and cellular and molecular mechanisms of human oncogenesis.

- **cellular and molecular immunology:** mechanisms of immune cell activation by microbes and their products, host responses to pathogen infection, role of commensal bacteria in modulation of immune responses and infection, mechanisms of inflammation, tumor immunology, mechanisms of innate immune responses, and functions of T-cell subsets.

Special Requirements for Admission
Students wishing to join the Molecular Microbiology Graduate Program must be enrolled in the Division of Basic Science and be in good standing academically. Students enter the Program after successfully completing the first-year Core Course and selecting a mentor. Initiation of the student’s dissertation research then commences. The faculty offers advanced courses in the areas of medical microbiology and infectious diseases (including immunology), molecular basis of microbial pathogenesis, microbial genetics, virology, viruses in human cancer, cell and molecular immunology, and genetic manipulation of the immune system. Participation in selected journal clubs and seminars offered within the Molecular Microbiology Graduate Program provide exposure to additional educational opportunities. The Program is supported in part by an NIH training grant and the S. Edward Sulkin endowment, which awards up to $1,000 annually to a highly deserving graduate student in the Program.

Curriculum
All Division of Basic Science students take the Core Course beginning in the fall of the first year of graduate study. Upon officially joining the Molecular Microbiology Graduate Program, students take the required courses and attend the Microbiology Seminar course (which includes the
student works-in-progress series and the Department of Microbiology Seminar Series) and the journal club (Contemporary Topics in Microbiology). Preparation for and completion of the qualifying examination should be done during the spring semester of the second year.

**REQUISITE COURSES**

Principles of Microbiology
Bacterial and Viral Genetics
Bacterial and Viral Pathogenesis
Immunology of Infectious Disease
Microbiology Seminar Series
Contemporary Topics in Microbiology
Research

Course descriptions are listed in the Division of Basic Science chapter of the catalog.

During the spring of the second year, students are required to pass a qualifying examination for admission to candidacy for the Ph.D. The qualifying examination consists of a written research proposal and its oral defense. Successful completion of the qualifying examination is required to advance to candidacy for the Ph.D.

The goal of the examination is to assess the student’s knowledge of fundamental facts in advanced molecular microbiology and his or her ability to synthesize these facts and apply them to scientific research. It is designed to foster the development of useful skills such as original thinking, critical reading of the literature, logical design of experiments, and focused interpretation of data.

After the student is admitted to candidacy, a supervisory committee is appointed with the supervising professor as Chair. This committee reviews and evaluates the student’s progress annually and, upon completion of the dissertation based on original research and the student’s public presentation of the work, participates in the final oral examination of the student.