Molecular Genetics and Microbiology Department

Chairperson
Jorge Benach, Life Sciences Building 280C (631) 632-4225

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Degree Awarded
Ph.D. in Molecular Genetics and Microbiology

Web Site
http://www.mgm.stonybrook.edu/index.shtml

Molecular Genetics and Microbiology Department

Graduate study in Molecular Genetics and Microbiology offers a diversified course of study leading to the Ph.D. degree. The major areas of study are the basic mechanisms of viral, bacterial, and fungal pathogenesis, and cancer biology.

Studies are directed toward an understanding of cell biology, molecular genetics, and microbial pathogenesis and are designed to prepare a student to become an effective research scientist.

The student prepares for a program of study in consultation with an advisory committee composed of faculty members active in several research areas. A research advisor, selected by the student at the end of the first year of study, then joins the advisory committee. The individualized program aims to develop breadth of understanding in the basic disciplines through active participation in laboratory research, coursework, and seminars.

Admission Requirements of Molecular Genetics and Microbiology

Pre-doctoral trainees in Molecular Genetics and Microbiology are admitted to the Graduate School of Stony Brook University by application to the Program. The final decision concerning admissions is made by the Dean of the Graduate School, and the candidate is officially notified by letter from the Dean’s office.

In addition to the minimum Graduate School requirements, the following are taken into account:

A. Undergraduate performance in science courses.
B. Percentile on the Graduate Record Examination (GRE) General Test.
C. Three letters of recommendation.

The program does not require, but prefers to see, evidence of research activity as an undergraduate student. Whenever possible, prospective students are invited to Stony Brook for interviews with the Program faculty.

All students who are accepted into the Molecular Genetics and Microbiology Program are accepted with full support. The level of support for 2014-2015 is $27,630 per calendar year plus full tuition scholarship. Health insurance is provided for all students as a fringe benefit.

Facilities of Molecular Genetics and Microbiology Department

The Department of Molecular Genetics and Microbiology occupies the second floor of the Life Sciences Building as well as space on the lower level, first and third floors of the Life Sciences Building. Program faculty members’ laboratories are also located on the first, second and third floors of the Centers for Molecular Medicine (CMM) and within other departments at Stony Brook University, Brookhaven National Laboratory, Cold Spring Harbor Laboratory and the Feinstein Institute for Medical Research. Approximately 47,000 square feet of research space are available within the Department of Molecular Genetics and Microbiology. Each research laboratory is fully equipped and, in addition, the Department provides access to a variety of communal central facilities and services. These include a cell culture and hybridoma facility, microinjection facility, flow cytometry, glassware washing and sterilization facility, analytical equipment lab, deconvolution microscopy facility, environmental rooms, darkrooms, and fermentor facility. Major items of equipment are organized into these central facilities, which are readily available to trainees. The Centers for Molecular Medicine, a new state-of-the-art research and teaching facility, serves as a physical and intellectual bridge between investigators in the adjacent Life Sciences Building and the nearby University Health Sciences Center. The Health Sciences Library and Barry S. Coller Learning Center, located in the Health Sciences Center, contains collections of biological and medical books and journals presently totaling 262,000 volumes, including more than 3,200 journal titles. In addition, the Health Sciences Library provides access to more than 2,300 full-text electronic journals. Other campus libraries include the Frank Melville, Jr. Memorial Library.

Requirements for the Ph.D. Degree in Molecular Genetics and Microbiology

The predoctoral training program offers its students the opportunity to study questions in virology, bacteriology, immunology, biochemistry, cancer biology, and cell and developmental biology utilizing the experimental approaches of the molecular biologist and geneticist. Instruction and course planning involve faculty members from the Department of Molecular Genetics and Microbiology and selected members from the Departments of Biochemistry and Cell Biology, Medicine, Pathology, Physiology and Biophysics, and Pharmacology, and from three outside
institutions, Cold Spring Harbor Laboratory, Brookhaven National Laboratory, and The Feinstein Institute for Medical Research. The general philosophy of the Program is that a successful research career in the diverse and heterogeneous area of molecular biology requires a broadly based background, familiarity with at least all of the above areas, and a frame of mind that is receptive to new approaches.

The Department of Molecular Genetics and Microbiology has an active seminar program of outside speakers who present topics relevant to molecular genetics and microbiology, and there is a yearly retreat in which ongoing research in the Department and recent progress in the field are presented and discussed. This retreat is held early in the fall in order to introduce new students to the faculty, to other students, and to the areas of ongoing research within the Department. The Department also presents a colloquium each fall on human diseases, with outstanding researchers from throughout the world presenting their current work on the selected topic. Students in the program are encouraged to attend all of these programs as part of their training.

In addition to the minimum requirements of the Graduate School, the following are required:

A. Course Requirements

It is the policy of the Department of Molecular Genetics and Microbiology that a student must obtain a grade of B or higher in each course. The decision to have students who receive a final grade below 3.0 re-take a course will be made by the Program’s Executive Committee on a case-by-case basis.

First Year

Fall
MCB 520 Graduate Biochemistry I
HBM 503 Molecular Genetics
HBM 509 Experimental Molecular Genetics and Microbiology (laboratory rotations)*
HBM 690 Molecular Genetics and Microbiology Seminar

Spring
HBM 522 Biology of Cancer (offered in alternate [even] years)
MCB 656 Cell Biology
HBM 510 Experimental Molecular Genetics and Microbiology (laboratory rotations)*
HBM 690 Molecular Genetics and Microbiology Seminar
HBM 692 Experimental Methods in Molecular Genetics and Microbiology
GRD 500 Integrity in Science
Teaching Practicum

*Students rotate through three different laboratories over the course of their first year. At the end of that year, students must identify and enter the laboratory in which they will conduct their dissertation research.

Second Year

Fall
HBM 640 Molecular Mechanisms of Microbial Pathogenesis
HBP 533 Immunology
HBM 599 Graduate Research
HBM 690 Molecular Genetics and Microbiology Seminar
HBM 691 Readings in Molecular Genetics and Microbiology Literature
Teaching Practicum

Spring
HBM 522 Biology of Cancer (offered in alternate [even] years)
HBM 599 Graduate Research
HBM 690 Molecular Genetics and Microbiology Seminar
HBM 693 Research Proposal Preparation in Molecular Genetics and Microbiology

B. Qualifying Exam
After the successful completion of all required courses, the student must write and defend a research proposal in an area distinct from his/her graduate research for the qualifying exam.

**C. Dissertation Proposal Exam**
Within 16 months of passing the qualifying exam, each student submits a written proposal of his or her dissertation research (similar to an NIH grant proposal) and orally defends the proposal before his or her dissertation committee shortly thereafter.

**D. Advancement to Candidacy**
After successfully completing all required and elective courses, the written comprehensive exam, and the dissertation proposal exam, the student will be recommended to the Graduate School for advancement to candidacy.

**E. Attendance and Participation in Student Seminar**
After being advanced to candidacy, the student is expected to participate actively in the Program’s student seminar series.

**F. Ph.D. Dissertation**
The research for the Ph.D. dissertation is conducted under the supervision of the dissertation committee, which is appointed by the Program and approved by the Dean of the Graduate School. A formal public oral defense of the dissertation is scheduled, at which the student presents his or her findings and is questioned by members of the dissertation committee and other members of the audience. A closed oral examination before the dissertation committee follows the seminar.

**G. Teaching Practicum**
It is expected that each graduate student completing a doctoral degree will have functioned as a teaching assistant during at least two semesters of his or her graduate studies.

**H. Publication Requirement**
All students must be the first author of at least one publication of original research in order to graduate. Students may schedule the dissertation defense, with the approval of the dissertation advisor, once the first-author manuscript has been submitted for publication.

Faculty of Molecular Genetics and Microbiology Department

**Distinguished Professors**
Benach, Jorge, Ph.D., 1971, Rutgers University: Pathogenesis of spirochetal infections and their host responses.
Wimmer, Eckard, Ph.D., 1962, University of Gottingen, Germany: The molecular biology of poliovirus replication and the molecular basis of picornaviral pathogenesis.

**Professors**
Bliska, James B., Ph.D., 1987, University of California, Berkeley: Molecular and cellular basis of bacterial-host interactions.
Carter, Carol A., Ph.D., 1972, Yale University: HIV and retroviral assembly and replication.
Del Poeta, Maurizio, M.D., 1992, University of Ancona, Italy: Role of sphingolipids in mediating signaling pathways and fungal pathogenesis.
Furie, Martha¹, Ph.D., 1980, The Rockefeller University: Interactions among endothelial cells, leukocytes, and pathogenic bacteria
Hearing, Patrick, Ph.D., 1980, Northwestern University: Viral molecular genetics; eukaryotic transcriptional regulation; gene therapy.
Konopka, James B., Ph.D., 1985, University of California, Los Angeles: G-protein coupled receptor signal transduction; fungal pathogenesis (Candida albicans).
Li, Ellen³, M.D., Ph.D., 1986, Washington University: inflammatory bowel diseases.
Marcu, Kenneth², Ph.D., 1975, University at Stony Brook: Immunoglobulin gene expression and recombination; regulation and mechanisms of action of the inhibitor of NF-kB kinase (IKK) complex.
Marshall, Nancy Reich, Ph.D., 1983, University at Stony Brook: Signaling switches in gene expression by hormones or viral infection.
Steigbigel, Roy³, M.D., 1966, University of Rochester School of Medicine: Treatment of HIV infection.
Thanassi, David, Ph.D., 1995, University of California, Berkeley: Secretion of virulence factors by bacterial pathogens; pilus biogenesis by uropathogenic E. coli.


Associate Professors

Carpino, Nicholas, Ph.D., 1997, University at Stony Brook; Positive and negative regulation of T cell receptor signaling.

Hearing, Janet C., Ph.D., 1984, University at Stony Brook: Influenza virus drug development.


Assistant Professors

Bhaduri-McIntosh, Sumita, M.D., Ph.D., 1991, Byramjee Jeejeebhoy Medical College: Epstein-Barr virus-host interactions

Chan, Edward, M.D., 1997, State University of New York, Buffalo: Growth factor receptors and cancer.

Krug, Laurie, Ph.D., 2001, Emory University: Virus-host interactions during chronic gammaherpesvirus infection.

van der Velden, Adrianus, Ph.D., 2000, Oregon Health and Science University: Salmonella pathogenesis.

Adjunct Faculty

Hannon, Gregory, Associate Professor. Ph.D., 1992, Case Western Reserve University: cellular proliferation control; double-stranded RNA-induced gene silencing.


Steinberg, Bettie M., Associate Professor. Ph.D., 1976, University at Stony Brook: Papilloma viruses; cell-virus interactions; viral transformation.

Stillman, Bruce W., Professor. Ph.D., 1979, Australian National University: Mechanism of eukaryotic DNA replication.

Research Faculty

Boon, Elizabeth, Assistant Professor. Ph.D., 2002, California Institute of Technology: Biofilms.


Kew, Richard, Assistant Professor. Ph.D., 1986, Stony Brook University: Leukocyte chemotaxis; inflammation; pulmonary immunopathology.

Krainer, Adrian, Professor. Ph.D., 1986, Harvard University: Posttranscriptional control of gene expression; alternative splicing; splicing in genetic diseases and cancer; antisense therapeutics.


Ma, Yupo, Professor. M.D., Jinan University, Ph.D., University of South Alabama: Leukemic stem cells, stem cell therapy and tissue repair.

Moll, Ute, Professor. M.D., 1985, University of Ulm: Tumor suppressor genes; role of p53 in human cancer.

Neiman, Aaron, Associate Professor. Ph.D., 1994, University of California, San Francisco: Vesicle trafficking and intracellular signaling in yeast.

Seeliger, Jessica, Assistant Professor\textsuperscript{13}, Ph.D., 2007, Stanford University: synthesis and assembly of cell membranes in Mycobacterium tuberculosis.

Spitzer, Eric, Associate Professor\textsuperscript{8}, M.D., Ph.D., 1985, Johns Hopkins University: Molecular biology of microbial pathogens.

Stenlund, Arne, Associate Professor\textsuperscript{6}, Ph.D., 1984, Uppsala University, Sweden: DNA replication of bovine papillomavirus.

Studier, F. William, Professor\textsuperscript{5}, Ph.D., 1963, Caltech: Genetics and physiology of bacteriophage T7; structural genomics.

Tonge, Peter J., Professor\textsuperscript{9}, Ph.D., 1986, University of Birmingham: Enzyme mechanisms and rational drug design.

Tonks, Nicholas, Professor\textsuperscript{6}, Ph.D., 1985, University of Dundee: Post-translational modification, phosphorylation and phosphatases.

Vakoc, Christopher, Assistant Professor\textsuperscript{6}, M.D., Ph.D., 2007, University of Pennsylvania: chromatin regulators and oncogenic signal transduction cascades.


\textbf{Number of teaching, graduate, and research assistants, fall 2014: 23}

1) Joint appointment, Department of Pathology
2) Joint appointment, Department of Biochemistry and Cell Biology
3) Joint appointment, Department of Medicine
4) Joint appointment, Department of Pediatrics
5) Brookhaven National Laboratory
6) Cold Spring Harbor Laboratory
7) The Feinstein Institute for Medical Research
8) Department of Medicine
9) Department of Chemistry
10) Department of Periodontics
11) Department of Biochemistry and Cell Biology
12) Department of Pathology
13) Department of Pharmacological Sciences

\textit{NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.}