Molecular and Cellular Pharmacology Department

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Degree Awarded
Ph.D. in Molecular and Cellular Pharmacology; MS in Biomedical Science (Molecular and Cellular Pharmacology track)

Molecular and Cellular Pharmacology Department

The faculty of the Department of Pharmacological Sciences, in conjunction with faculty in other departments at Stony Brook, offers the Graduate Program in Molecular and Cellular Pharmacology leading to the Ph.D. degree. Because the program emphasizes early research experience and provides a broad curriculum, students lay the foundation for subsequent independent research. Graduate research opportunities are provided in a broad range of areas including biochemical and molecular pharmacology, chemical pharmacology and toxicology, and cellular and physiological pharmacology. Students, in consultation with faculty advisors, pursue basic and elective courses and begin thesis research during the first two years of training. During this time, they participate in several research projects directed by faculty members associated with the program. Students then select a research advisor from the faculty and, upon completion of the qualifying exam, devote full effort to dissertation research. Students have the opportunity to perform research rotations and/or thesis research in any of 52 associated laboratories in Department of Pharmacological Sciences or other University departments or at Brookhaven National and Cold Spring Harbor Laboratories. Further details may be obtained from the graduate program director.

Admission Requirements of Molecular and Cellular Pharmacology Department

For admission to the Graduate Program in Molecular and Cellular Pharmacology, the following, in addition to the minimum Graduate School requirements, are normally required:

A. A bachelor’s degree in an appropriate field (biology, chemistry, biochemistry, microbiology, physics) with evidence of superior performance in science courses. Coursework in biochemistry, physical chemistry, organic chemistry, and physiology is highly recommended.

B. Three letters of reference are required.

C. Graduate Record Examination (GRE) General Test scores are required, as is the TOEFL for foreign students. An advanced test in biochemistry, biology, chemistry, computer science, physics, or mathematics is desirable.

D. Acceptance by both the Department of Pharmacological Sciences and the Graduate School.

E. Students accepted into the graduate program receive stipend support and full tuition scholarships. The current stipend level (2010-2011) is $26,500 and includes health insurance coverage.

Facilities of Molecular and Cellular Pharmacology Department

The Department of Pharmacological Sciences is the primary training facility for graduate studies in Molecular and Cellular Pharmacology. The department occupies 32,000 square feet in the University’s Basic Sciences Tower, 5,000 square feet in the Center for Molecular Medicine, and 5,000 square feet in the Graduate Chemistry Building. Faculty laboratories are equipped for all types of modern molecular and cell biological, biochemical, neurochemical, chemical, biophysical, and toxicological research. Specialized facilities are provided for tissue culture, recombinant DNA work, ultracentrifugation, scintillation and gamma spectrometry, transgenic mouse research, electron microscopy, confocal microscopy, molecular modeling, gas and high-performance liquid chromatography, proteomics, nuclear magnetic resonance, X-ray crystallography, and mass spectrometry. Research activities are supported by various shops, University computing facilities, animal-care facilities, and media services. Excellent library facilities, including include the Health Sciences Library, the Pharmacological Sciences Library and online resources, comprising of databases, E-books and E-journals, Program faculty members currently receive more than $14 million in annual research support from federal and private agencies.

Requirements for the Ph.D. Degree in Molecular and Cellular Pharmacology

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

A. Course Requirements
1. Biomolecular Structure & Analysis (CHE 541)

2. Graduate Physiology (HBY 501)
3. Biochemical Laboratory Techniques (HBH 545, HBH 546)
4. Cell Biology (MCB 656)
5. Principles of Pharmacology series (HBH 631, HBH 632)
6. Integrity in Science (GRD 500)
7. Proposal Preparation in Regulatory Biology (HBH 560)
8. One elective
9. Practicum in Teaching Pharmacology (HBH 601)
10. Journal Club (HBH 580)
11. Seminar (HBH 590)—every semester
12. Research (HBH 599 before advancement to candidacy, HBH 699 after advancement to candidacy).

Depending on prior course work, students may adjust these requirements with the consent of the Steering Committee of the Graduate Program.

B. Research Rotations
Students are required to complete three rotations in laboratories affiliated with the program during the first two semesters and the following summer. The host laboratory for thesis research is typically selected from one of these three rotations.

C. Qualifying Exam
In the second year, students are required to write and orally defend a research proposal on a topic unrelated to their thesis research.

D. Thesis Proposal Examination
In the fall semester of the third year, students select a thesis committee including three program faculty and one extramural faculty member to evaluate their written thesis proposal and their oral defense of the proposal.

E. Advancement to Candidacy
Following completion of coursework, and satisfactory performance on the qualifying examination and research proposal examination, students will be recommended to the Graduate School for advancement to Ph.D. degree candidacy.

F. Ph.D. Dissertation
The research for the Ph.D. dissertation is conducted under the supervision of the thesis committee. Upon approval of the completed dissertation by this committee, a dissertation examining committee is appointed 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 examining committee and by other members of the audience.

G. Teaching Requirement
It is expected that each graduate student completing a doctoral degree will have functioned as a teaching assistant during at least one semester of his or her graduate career (HBH 601).

H. Residence Requirement
The University requires at least two consecutive semesters of full-time graduate study. The demands of the program necessitate a longer period of residence.

I. Electives
To complete their course requirements, students must take one elective course. The following is a list of courses offered by other programs in the university. This subset of elective courses represents courses that are recommended or that students have taken in the last several years.

Biology: MCB 657 Principles of Development
Biology: MCB 517 Biomembranes
Biology: MCB 503 Molecular Genetics
Chemistry: CHE 542 Chemical Biology
Genetics: BGE 510 Graduate Genetics
Biochemistry: BMO 512 Physical Biochemistry
Microbiology: HBM 640 Mol. Mechanisms of Microbial Pathogenesis
Pathology: HBP 533 Immunology
Physiology: HBY 561 Statistical Analysis of Physiological Data
Requirements of the MS Degree in Biomedical Science (Molecular and Cellular Pharmacology track)

Completion will require 42 graduate level credits and a thesis. 24 credits in required courses, up to 6 credits in electives and 12-18 research credits.

Required:
1. Principals of Pharmacology (HBH 501)
2. Advanced Pharmacology (HBH 502)
3. Pharmacology Colloquium (HBH 506)
4. Seminar (three times) (HBH 590)
5. Molecular genetics (MCB 503)
6. Graduate Biochemistry (MCB 520)
7. Cell Biology (MCB 656)
8. Integrity in Science (GRD 500)

Electives (choose 0 to 6 credits)
1. Principles of Development (MCB 657)
2. Signal Transduction (HBH 553)
3. Neuropharmacology (HBH 655)

Research (choose 12 - 18 credits)
1. Research Lab Rotation
2. Thesis Research

Faculty of Molecular and Cellular Pharmacology Department

Distinguished Professors
Reich, Edward, M.D., 1956, Johns Hopkins University; Ph.D., 1962, Rockefeller University: Autocrine regulation; parasite biochemistry; design of new therapeutic systems.

Leading Professor
Malbon, Craig C., Ph.D., 1976, Case Western Reserve University: Wnt-frizzled signaling via G-proteins in development; analysis of signaling complexes.

Professors
Bliska, James, Ph.D., 1988, University of California, Berkeley: Molecular and cellular basis of bacterial-host cell interactions.
Bogenhagen, Daniel, M.D., 1977, Stanford University School of Medicine: Replication, transcription and repair of mammalian mitochondrial DNA; mitochondrial proteomics.
Cohen, Ira S., M.D., Ph.D., 1974, New York University: Electrophysiology of the heart.
Eisenberg, Moises, Ph.D., 1972, California Institute of Technology: Application of bioinformatics tools to study comparative genen organization.
Demple, Bruce, Ph.D., UC Berkeley; Mechanisms and roles of human enzymes that repair oxidative (free radical) damage in DNA.
Frohman, Michael A., Chair, M.D., Ph.D., 1985, University of Pennsylvania: Neural differentiation and signal transduction.
Ghebrehiwet Berhane, D.V.M., D.Sc.: C1q receptor mediated cellular responses with particular emphasis on inflammation and microbial infection.
Haltiwanger, Robert, Ph.D., 1986, Duke University: Regulation of signal transduction by glycoproteins.
Iden, Charles R., Ph.D., 1971, Johns Hopkins University: Biomedical applications of mass spectrometry; proteomics; characterization of DNA adducts and DNA repair mechanisms; synthesis of modified oligodeoxynucleotides.
Johnson, Francis, Ph.D., 1954, University of Glasgow, Scotland: Synthesis of natural products; DoM reactions; antiviral agents; mechanism of action of carcinogens and mutagens; site-specific mutagenesis; DNA damage and mechanisms of action of DNA-repair enzymes.

Levine, Joel,11 Ph.D., 1980, Washington University: Glial Cells, Proteoglycans and the Regulation of Axonal Growth

McKinnon, David,11 Ph.D., 1987, Australian National University, Australia: Molecular physiology of neurons and cardiac muscle.

Miller, W. Todd,14 Ph.D., 1987, Rockefeller University: Signal transduction by tyrosine kinases.


Prives, Joav M., Ph.D., 1968, McGill University, Canada: Regulation of surface receptors in muscle cells.

Reich, Nancy C.,10 Ph.D., 1983, University at Stony Brook: Signal transduction and gene expression induced by cytokines and viral infection.


Said, Sami I.,9 M.D., 1951, Cairo University, Egypt: Physiology and pharmacology of VIP and related neuropeptides, with special reference to their modulation of cell injury, inflammation, and cell death, and their potential as therapeutic agents.

Sampson, Nicole,2 Ph.D., 1990, University of California, Berkeley: Integrin receptor interactions in mammalian fertilization/enzymology of cholesterol oxidase.

Schechter, Nisson,15 Ph.D., 1971, Western Michigan University: Structure, function, and regulation of intermediate filament proteins and homeobox proteins during zebrafish neurogenesis.

Steigbigel, Roy,1 M.D., 1966, University of Rochester: HIV treatment and immunoreconstitution.

Tonge, Peter,2 Ph.D. 1986, University of Birmingham, England: Biological chemistry and enzyme mechanisms; quantitating substrate strain in enzyme-substrate complexes using vibrational spectroscopy; rational drug design.

Tsirka, Styliani-Anna (Stella) E.,16 Graduate Program Director, Ph.D., 1989, University of Thessaloniki, Greece: Neuronal-microglial interactions in the physiology and pathology of the central nervous system.

Van Nostrand, William,9 Ph.D., 1985, University of California: Cerebrovascular pathology in Alzheimer’s disease and related disorders

Associate Professors

Crawford, Howard, Ph.D., 1993, University of Texas Southwestern Medical Center at Dallas: Pancreatic cancer.

De los Santos, Carlos, Ph.D., 1987, University of Buenos Aires, Argentina: NMR solution structures of damaged nucleic acids and repair proteins.


Enikolopov, Grigori N.,17 Ph.D. 1978, Institute of Molecular Biology, USSR Academy of Science: Stem cells; neurogenesis; development; signal transduction


Simmerling, Carlos,2 Ph.D., 1994, University of Illinois, Chicago: Computational chemistry and structural biology; molecular dynamics of biological macromolecules.

Schärer, Orlando, Ph.D., 1996, Harvard University: Chemical Biology of Mammalian DNA Repair.

Takemaru, Ken-Ichi, Ph.D., 1997, Graduate University for Advanced studies, Japan: Wnt Signaling in Development and Disease.

Talmage, David,10 Ph.D., 1981, University of Minnesota; Interactions between retinoids and receptor tyrosine kinase signaling pathways.

Thomsen, Gerald H.,7 Ph.D., 1988, The Rockefeller University: Vertebrate Embryonic Development

Wollmuth, Lonnie11, Ph.D., 1992, University of Washington: Molecular mechanisms of synaptic transmission.
White, Thomas\textsuperscript{14}, Ph.D., 1994, Harvard University; Molecular biology and physiology of gap junction channels.

Assistant Professors

Aguirre, Adan, Ph.D. 2002, Centro de Investigacion y de Estudios Avanzados IPN (CINVESTAV-IPN), Mexico; Using endogenous NG2-progenitor cells for cell-based replacement for a variety of brain pathologies.

Bowen, Mark\textsuperscript{14}, Ph.D. 1998, Univ. of Illinois at Chicago: Single molecule spectroscopy; Coordination of post-synaptic glutamate receptor signaling by the MAGUK family of scaffolds.

Chen, Emily, Ph.D. 2002, Univ. of California, San Diego: Proteome signature of organ-specific metastasis.

Cao, Jian\textsuperscript{12}, M.D. 1985, Henan Medical College (China), M.S. 1992, Peking Union Medical College, Biology and prevention of cancer metastasis.


Carpino, Nicolas\textsuperscript{10}, Ph.D., 1997, Stony Brook University.

Chen, Emily, Ph.D., 2002, University of California, San Diego; Breast Cancer Metastasis and Shotgun Proteomics.

Fu, Dax\textsuperscript{6}, Ph.D., 1995, Mayo Graduate School of Medicine: Biochemical and x-ray crystallographic studies of transmembrane active processes via membrane channels and transporters.

Garcia-Diaz, Miguel; Ph.D. 2003, University of Madrid, Spain: Structural enzymology of DNA/RNA transactions.

Nassar, Nicolas\textsuperscript{14}, Ph.D., 1992, European Molecular Biology Laboratory, Grenoble, France: Regulation of signaling proteins.


Seeliger, Markus, Ph.D., 2003, Cambridge University, Trinity College; Using NMR and ligand binding kinetics to study Abl and Src kinase domains.

Wei-Xing Zong,\textsuperscript{10} Ph.D. 1999, UMDNJ -Robert Wood Johnson Medical School, New Jersey: Molecular Regulation of apoptotic and necrotic cell death.

Research Faculty

Berrios, Miguel, Associate Professor. Ph.D., 1983, Rockefeller University: Polypeptide structure of the cell nucleus; nuclear assembly and disassembly; mapping genomic DNA damage and repair assembly and disassembly; fertilization and pronuclear formation.

Dewey, Stephen L., Ph.D., 1985, University of Iowa: Imaging neurotransmitter interactions with PET and fMRI

Dickman, Kate, Assistant Professor, Ph.D., Investigation of aristolochic acid, a compound found in certain herbal medicines, and its association with renal disease and cancer.

Li, Feng-Qian, Assistant Professor; Ph.D., University of Advanced Studies/ National Institute of Genetics, Japan: Function of signaling regulators involved in cell growth regulation, cancer biology and adipogenesis.

Moriya, Masaaki, Professor. Ph.D., 1981, Nagoya University, Japan: Cellular response to DNA damage.

Rosenquist, Thomas, Assistant Professor. Ph.D., 1989, University of Wisconsin-Madison; Genetic analysis of mammalian oxidative DNA damage repair.

Shibutani, Shinya, Professor. Ph.D., 1983, Toyama Medical and Pharmaceutical University, Japan: Mechanisms of translesional DNA synthesis.

Volkow, Nora D.\textsuperscript{15,16} M.D., 1981, National University, Mexico: Imaging studies of neuropharmacological agents; positron emission (PET) scanning.

Robert Watson, Ph.D., The University of Iowa; Insulin-stimulated Translocation of the GLUT4 Glucose Transporter.

Number of teaching, graduate, and research assistants, Fall 20010: 37

1) Joint appointment, Department of Medicine
2) Joint appointment, Department of Chemistry
3) Joint appointment, Department of Neurobiology and Behavior
4) Joint appointment, Department of Physiology and Biophysics
5) Joint appointment, Cold Spring Harbor Laboratory
6) Joint appointment, Brookhaven National Laboratory
7) Primary appointment with Department of Biochemistry and Cell Biology
8) Primary appointment with Department of Chemistry
9) Primary appointment with Department of Medicine
10) Primary appointment with Department of Molecular Genetics and Microbiology
11) Primary appointment with Department of Neurobiology and Behavior
12) Primary appointment with Department of Pathology
13) Primary appointment with Department of Pediatrics
14) Primary appointment with Department of Physiology and Biophysics
15) Primary appointment with Department of Psychiatry
16) Primary appointment with Brookhaven National Laboratory
17) Primary appointment with Cold Spring Harbor
18) Primary appointment with Department of Neurology
19) Primary appointment with Department of Applied Math

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