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 (2015-2016) is $27,630 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
Physiology: HBY 564 Experimental Techniques in Systems Physiology

Requirements of the MS Degree in Biomedical Science (Molecular and Cellular Pharmacology track)

Completion will require 33 graduate level credits and a thesis. 23-28 credits in required courses, up to 6 credits in electives and 5-10 research credits.

**Thesis-Option** Requirements:
1. Principles of Pharmacology (HBH 501)
2. Advanced Pharmacology (HBH 502)
3. Seminar (three times) (HBH 590)
4. Graduate Biochemistry (MCB 520)
5. Cell Biology (MCB 656)
6. Integrity in Science (GRD 500)
7. Lab Methods (HBH 545, HBH 546)
8. Statistics (HBH 550)
9. Research (HBH 599)

Electives (choose 0 to 6 credits)
1. Principles of Development (MCB 657)
2. Signal Transduction (HBH 553)
3. Neuropharmacology (HBH 655)
4. Molecular Genetics (MCB 503)
5. Communicating Science (JRN 501-505)
6. Pharmacology Colloquium (HBH 506)

**Final Written Thesis**
In their final semester of the Program, students will select a thesis committee that includes three program faculty to evaluate their written thesis. Students will also give a seminar on their research during their final semester in the program.

**Non-Thesis-Option** Requirements:
1. Principles of Pharmacology (HBH 501)
2. Advanced Pharmacology (HBH 502)
3. Pharmacology Colloquium (HBH 506)
4. Seminar (three times) (HBH 590)
5. Graduate Biochemistry (MCB 520)
6. Cell Biology (MCB 656)
7. Integrity in Science (GRD 500)
8. Lab Methods (HBH 545, HBH 546)
9. Research (HBH 599)

Electives (choose 0 to 6 credits)
1. Principles of Development (MCB 657)
2. Signal Transduction (HBH 553)
3. Neuropharmacology (HBH 655)
4. Molecular Genetics (MCB 503)
5. Communicating Science (JRN 501-505)
6. Statistics (HBH 550)

The non-thesis option requires a total of 33 graduate level credits and a culminating literature review project that must be developed in consultation with the Program Director. Additional approved elective courses are also required, and must be chosen in consultation with the Program Director.
Faculty of Molecular and Cellular Pharmacology Department

Distinguished Professors

Leading Professor
Malbon, Craig C., Ph.D., 1976, Case Western Reserve University: Wnt-frizzled signaling via G-proteins in development; analysis of signaling complexes.
Cohen, Ira S., M.D., Ph.D., 1974, New York University: Electrophysiology of the heart.

Professors
Biegon, Anat, Ph.D., Weizmann Institute of Science; Brain response to traumatic, ischemic or inflammatory insults
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.
De los Santos, Carlos, Ph.D., 1987, University of Buenos Aires, Argentina: NMR solution structures of damaged nucleic acids and repair proteins.
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.
Levine, Joel, Ph.D., 1980, Washington University: Glial Cells, Proteoglycans and the Regulation of Axonal Growth
Lin, Richard, M.D., University of California San Francisco. Intracellular signaling molecules that regulate cell growth.
McKinnon, David, Ph.D., 1987, Australian National University, Australia: Molecular physiology of neurons and cardiac muscle.
Miller, Lisa, Ph.D., 1995, Albert Einstein College of Medicine. The chemical makeup of tissue in disease using high-resolution infrared and x-ray imaging.
Miller, W. Todd, Ph.D., 1987, Rockefeller University: Signal transduction by tyrosine kinases.
Reich, Nancy C., Ph.D., 1983, University at Stony Brook: Signal transduction and gene expression induced by cytokines and viral infection.
Sampson, Nicole, Ph.D., 1990, University of California, Berkeley: Integrin receptor interactions in mammalian fertilization/enzymology of cholesterol oxidase.
Schärer, Orlando, Ph.D., 1996, Harvard University: Chemical Biology of Mammalian DNA Repair.
Simmerling, Carlos, 2 Ph.D., 1994, University of Illinois, Chicago: Computational chemistry and structural biology; molecular dynamics of biological macromolecules.
Shroyer, Kenneth, M.D. 1987, Ph.D. 1983, University of Colorado. The molecular characterization of benign, premalignant, and malignant lesions of the female genital tract
Steigbigel, Roy., M.D., 1966, University of Rochester: HIV treatment and immunoreconstitution.

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

Tonge, Peter, 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., Graduate Program Director, Ph.D., 1989, University of Thessaloniki, Greece: Neuronal-microglial interactions in the physiology and pathology of the central nervous system.


White, Thomas, Ph.D., 1994, Harvard University; Molecular biology and physiology of gap junction channels.

Yang, Vincent, M.D. 1984, Ph.D. 1980, Princeton University, Robert Wood Johnson Medical School: Molecular mechanisms that control proliferation and differentiation of the intestinal epithelial cells.

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

Associate Professors


Bowen, Mark, Ph.D., University of Illinois, 1998, Single molecule spectroscopy; Coordination of post-synaptic glutamate receptor signaling by the MAGUK family of scaffolds.

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


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


Girnun, Geoffrey, Ph.D. Cancer Metabolomics.


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

Wollmuth, Lonnie, Ph.D., 1992, University of Washington: Molecular mechanisms of synaptic transmission.

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.

Chan, Chia-Hsin, Ph.D. National Taiwan University. Cancer Metabolism and Stemness.

Ge, Shaoyu, Ph.D. University of Science and Technology (China). To examine the functional integration of new neurons into brain circuits.

Jia, Shu, Ph.D., Princeton University. Super-resolution optical microscopy.

Luk, Ed, Ph.D., How cells organize chromatin structure to accommodate and control gene expression.

Martin, Benjamin, Ph.D., Molecular basis of stem cell development and cancer pathogenesis.
Seeliger, Jessica, Ph.D., Stanford University. Membrane biosynthesis, structure & behavior in bacterial pathogenesis.

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

Research Faculty

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 Insitute 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.

Number of teaching, graduate, and research assistants, Fall 2010: 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.