Biochemistry and Cell Biology (BCB) MS Program

Chairperson
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Degree awarded
Master of Science (MS) in Biochemistry and Cell Biology

Website
https://www.stonybrook.edu/commcms/biochem/education/graduate/biochemistry-and-cell-biology-ms

Application
https://graduateschool.stonybrook.edu/apply/

Biochemistry and Cell Biology MS Program Description

The graduate program leading to the MS degree in Biochemistry and Cell Biology is intended to provide a sound scientific foundation for those planning to pursue a career in research, teaching, entry into a career in biotechnology, or further graduate studies in the life sciences. In addition, for students interested in attending medical, dental, veterinary or other health-related schools, the MS degree program can complement and enhance their background in the biochemical sciences including biochemical, biomedical, and molecular biology research. Core concepts and skills are taught through a series of required core courses, with the remaining coursework consisting of advanced electives and special topics courses selected in consultation with the student’s advisory committee. The curriculum is comprised of 24 credit hours earned in biochemistry, cellular biology and molecular genetics courses that are complemented by hands on laboratory research and exposure to advanced methods in biochemistry and cell biology. The remaining credits may be selected from elective courses, special seminar courses, and courses in experimental design, data analysis and laboratory techniques. Both research-based and literature-based thesis options are available and can be completed by fulltime students in three semesters. The program includes faculty from the Departments of Biochemistry and Cell Biology, Chemistry, Physiology and Biophysics, and the Pharmacological Sciences, as well as from Brookhaven National Laboratory.

For more detailed information, visit the BCB MS Web site at: https://www.stonybrook.edu/commcms/biochem/education/graduate/biochemistry-and-cell-biology-ms

Biochemistry and Cell Biology (BCB) MS Program Admissions

Application Deadline: April 15

Applicants are considered from September until April 15 every year.

Applicants do not need to send their official transcripts until they are offered admission into the program.

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

- BS or BA degree in a life science related field, with a minimum undergraduate grade point average of 3.00. Pre-requisites include mathematics through one year of calculus, chemistry (including organic chemistry and laboratory), general physics, and one year of biology (including laboratory). It is highly recommended that students have taken two semesters of biochemistry, and one semester each of genetics, cell biology, physical chemistry, and English composition. Students accepted into the program without a pre-requisite may be asked to take the appropriate upper level undergraduate course prior to undertaking specific graduate level courses.

- Personal Statement: What would you consider your special qualifications to be? What do you propose to do with your advanced degree professionally? Discuss briefly your experience in biochemistry and cell biology outside the classroom.

- Three letters of recommendation from people who can evaluate the applicant’s potential for graduate work and independent research.

- International Students: A proficiency in the English language is required. If your native or primary language is not English, you must take an English proficiency test. To be considered for admission, an applicant must present an acceptable score on the TOEFL or IELTS test. IELTS: Overall score of 6.5 with no subsection below 6. TOEFL: Paper-based test: 550; computer based test: 213; or Internet-based test: 90. Under special circumstances, lower scores may be considered.

FACILITIES

The Biological Sciences Division and Health Sciences Center are well equipped for work in biochemistry and cellular biology. Individual faculty laboratories and central services provide a full array of state-of-the-art equipment. These include the Flow Cytometry Facility, the Cell Culture and Hybridoma Facility, the Transgenic Mouse Facility, the University Microscopy Imaging Center, and the Center for Analysis and Synthesis of Macromolecules. The Health Sciences Library contains a comprehensive collection of biomedical journals and books and is complemented by the Melville Library on the main campus.

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
Degree Requirements for Biochemistry and Cell Biology (BCB) MS Program

**Research-based thesis option (30 credits)**
The research-based thesis option requires 30 credits comprised of 24 credits in core courses, at least 2 credits of MS Thesis in Biochemistry and Cell Biology in addition to the Research Practicum course included in the core curriculum, and 6 elective credits. Thesis research can be conducted in the laboratory of Biochemistry and Cell Biology faculty, in the research laboratories of faculty from other Departments at Stony Brook, and at Brookhaven National Laboratory, or through research internships under the guidance of approved mentors at local biotechnology firms. This option requires completion of a written, research-based project.

**Literature-based thesis option (30 credits)**
The literature-based thesis option requires 30 credits comprised of 24 credits in core courses, including 4 credits of MS Research practicum, 2 credits of MS Thesis in Biochemistry and Cell Biology, and 6 elective credits. This option requires completion of a written, literature-based project.

**Core Course Requirements (24 credits)**
- MCB 503 Molecular Genetics (Fall, 3 credits)
- MCB 520 Graduate Biochemistry I (Fall, 3 credits)
- MCB 656 Cell Biology (Spring, 4 credits)
- BCB 551 Introduction to Research in Biochemistry and Cell Biology, Integrity in Science (Fall, 2 credits)
- BCB 552 Advanced Laboratory Methods in Biochemistry and Cell Biology (Fall, 3 credits)
- BCB 559 MS Research Practicum in Biochemistry and Cell Biology (Fall, Spring & Summer, 0-4 credits)
- BCB 599 MS Thesis in Biochemistry and Cell Biology (Fall, Spring & Summer, 0 – 6 credits)
- MCB 601 Colloquium in Molecular and Cellular Biology (Fall, 1 credit)
- MCB 602 Colloquium in Molecular and Cellular Biology (Spring, 1 credit)

**FACULTY**

**Department of Anesthesiology**
- Martin Kaczocha
  Role of fatty acid binding proteins in pain, inflammation, and related pathophysiology; Endocannabinoid pharmacology and development of novel therapeutics.

**Department of Biochemistry and Cell Biology**
- Paul M. Bingham
  Genetic control of development and gene expression in animals
- Deborah Brown
  Cholesterol/sphingolipid-rich domains in membrane signaling
- Vitaly Citovsky
  Nuclear targeting and intercellular communication in plants
- Neta Dean
  Glycosylation; fungal pathogenesis
- Dale G. Deutsch
  Marijuana; molecular neurobiology of anandamide
- Jarrod B. French
  Structure and function of protein complexes involved in cellular metabolism
- J. Peter Gergen
  Gene expression and development in Drosophila
- Steven Glynn
  Structure and mechanism of protein-unfolding machines in mitochondria
- Robert Haltiwanger
  Glycobiology; biosynthesis, structure, and function
- Bernadette C. Holdener
  Genetic regulation of early mammalian development
- Nancy Hollingsworth
  Meiotic synopsis, recombination, and segregation in yeast
- Wali Karzai
  Structure and function of RNA-binding proteins and biochemical studies of the SmpB•tmRNA quality control system
- Sasha Levy
  Evolutionary dynamics, network dynamics, yeast genomics, high-throughput technology development
- Huilin Li
  Structure and function of large protein machines
- Erwin London
  Membrane protein structure/translocation/folding
- Ed Luk
  Chromosome biology and genome regulation
- Benjamin Martin
  Stem cell maintenance and differentiation, Developmental mechanisms of cancer pathogenesis

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
David Q. Matus  
Evolutionary, cell and developmental biological approaches to studying nematode uterine-vulval attachment and morphogenesis

Aaron Neiman  
Vesicle trafficking and membrane/cytoskeletal interactions

Sanford Simon  
Extracellular degradation by neutrophil proteases

Steven Smith  
Structure and function of membrane proteins

Rolf Sternglanz  
Chromatin structure and function; gene expression; HATs

Gerald H. Thomsen  
Growth factors/signal transduction in early vertebrate development

**Department of Chemistry**

Elizabeth Boon  
Nitric oxide regulation of quorum sensing and biofilm formation in bacteria

The research in our group centers around the concept of chemical biology. In particular, we introduce unnatural monomers into the biopolymers of life (proteins, oligosaccharides, oligonucleotides) for the purpose of tracking or perturbing biological processes.

Liang Gao  
Super-resolution fluorescence microscopy, 3D live fluorescence imaging and quantitative analysis of 3D image data sets

Carlos Simmerling  
Development of tools for efficient and simulation of chemical systems and using them to study the structure and dynamics of molecules involved in biological processes.

Peter Tonge  
Spectroscopic insights into enzyme mechanisms and structure

**Department of Medicine**

Berhane Ghebrehiwet  
Biochemistry; function of the complement system

Yusuf Hannun  
Bioactive lipids in cancer pathogenesis and therapeutics

Richard Lin  
Kinase signaling and cell proliferation

Cungui Mao  
Bioactive sphingolipids in cell growth, differentiation, apoptosis, and autophagy

Lina M. Obeid  
Bioactive lipids in Inflammation, Aging and Cancer

William Van Nostrand  
Vascular functions of Alzheimer’s disease amyloid beta-protein

Vincent Yang  
Biology and pathobiology of intestinal epithelial stem cells and colorectal cancer.

**Department of Molecular Genetics & Microbiology**

Jorge Benach  
Pathogenesis of spirochetal infections and their host responses

Nicolas Carpino  
Positive and Negative Regulation of T cell Receptor Signaling

Bruce Futcher  
Cell cycle, cyclins, and yeast genetics

Michael Hayman  
Viral/cellular oncogenes; differentiation of erythroid cells

Patrick Hearing  
Adenovirus regulation of cellular proliferation and gene expression; adenovirus vectors for human gene therapy

James Konopka  
Signal transduction, morphogenesis and genetics of pathogenic fungi

Laurie Krug  
My lab’s research interests lie in understanding the molecular determinants of virus-host interactions during chronic gammaherpesvirus infections using a mouse model pathogen.

Janet Leatherwood  
Cell cycle control and DNA replication in fission yeast
Erich R. Mackow
Viral Pathogenesis, Regulation of Innate Immunity, Hantavirus, Dengue Virus and Rotavirus Regulation of Cell Signaling Responses, miRNAs and Endothelial cell functions.

Nancy Reich
Cytokine and Innate Immune Responses

Brian Sheridan
Mucosal Immunology, T cell memory, Vaccine design, Host-pathogen interactions

David Thanassi
Secretion of virulence factors by bacterial pathogens; pilus biogenesis by uropathogenic Escherichia coli

Adrianus. W.M. van der Velden
Infectious Diseases Immunology; Host Interactions with Bacterial Pathogens; Bacterial Immune Subversion

Eckard Wimmer
RNA virus genetics, replication, pathogenicity, cellular receptors

Department of Neurobiology and Behavior

Simon Halegoua
Molecular control of the neuronal phenotype

Maurice Kernan
Molecular basis of mechanical senses

Joel Levine
Cell-surface molecules of the developing nervous system

David McKinnon
Molecular physiology of sympathetic neurons and cardiac muscle

Howard Sirotkin
Genetic and molecular analysis of early vertebrate development

Lonnie Wollmuth
Molecular mechanisms of synaptic transmission

Department of Oral Biology and Pathology

Soosan Ghazizadeh
Epithelial stem cell biology; Skin bioengineering and gene therapy.

Department of Pathology

Jiang Chen
Skin and hair follicle development, maintenance and malignancy

Howard B. Fleit
Leukocyte Fc receptors; macrophage differentiation

Martha Furie
Host inflammatory response to bacterial infections.

Jingfang Ju
Post-transcriptional control of non-coding RNAs and RNA binding proteins in cancer

Richard R. Kew
Leukocyte chemotaxis/inflammation

Yupo Ma
Stem cell reprogramming and therapy, genome engineering, blood and marrow transplantation

Ute Moll
Tumor suppressor genes; mechanism of p53 inactivation

Kenneth Shroyer
Cancer biomarkers as diagnostic adjuncts in cervical pathology and cytopathology; cervical cancer and HPV

Eric Spitzer
Molecular biology of Cryptococcus neoformans

Department of Pharmacological Sciences

Adan Aguirre
Stem cell biology in the central nervous system and neurobiology in health and disease

Daniel Bogenhagen
Mitochondrial DNA; DNA repair

Holly Colognato
Extracellular matrix in the brain; roles during development and during neurodegeneration.

Michael A. Frohman
Lipid signaling pathways in immune responses, Alzheimer's disease, cardiovascular disease, and cancer.

Miguel Garcia-Diaz
Genetic Toxicology/Mechanisms of mitochondrial gene expression

Craig C. Malbon
Heterotrimetric G-proteins in development and cancer

Joav Prives
Cytoskeletal membrane interactions in muscle cells

Jessica C. Seeliger
We are applying biochemical, microbiological and biophysical methods to fundamental questions in bacterial membrane biogenesis
as they relate to *Mycobacterium tuberculosis*, the bacterium that causes tuberculosis, and to bacterial pathogenesis in general: How is lipid biosynthesis accomplished at the cytosol-membrane interface? What are the molecular mechanisms underlying bacterial membrane assembly? How can we subvert lipid biosynthesis and membrane assembly pathways for antimicrobial therapy?

Markus Seeliger  
Mechanism of Protein kinases and Ubiquitin Ligases in Cancer and Aging

Orlando Schärer  
Chemical Biology of DNA damage and repair.

Ken-Ichi Takemaru  
Wnt Signaling in Development and Disease

Styliani-Anna Tsirka  
Neuronal-microglial interactions in the central nervous system

**Department of Physiology and Biophysics**

Mark Bowen  
Single molecule spectroscopy; Coordination of post-synaptic glutamate receptor signaling by the MAGUK family of scaffolds

W. Todd Miller  
Tyrosine phosphorylation and signal transduction

Suzanne Scarlata  
Cell signaling through heterotrimeric G proteins

Ilan Spector  
Neuronal differentiation and microfilaments

Hsien-yu Wang  
Our research group focuses on Wnt signaling in 1) regulation of cell signaling and 2) differentiation of embryonic stem cells.

Thomas White  
Molecular biology and physiology of gap junction channels

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