

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://app.applyyourself.com/AYApplicantLogin/fl_ApplicantLogin.asp?id=sunysb-gs

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

Applications 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 will 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.

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 pathophysiologies: 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

Jarrold 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 synapsis, 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

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
Isaac Carrico	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 <i>Escherichia coli</i>
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.
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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 <i>Cryptococcus neoformans</i>

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	Heterotrimeric 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

Markus Seeliger

Orlando Schärer

Ken-Ichi Takemaru

Styliani-Anna Tsirka

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?

Mechanism of Protein kinases and Ubiquitin Ligases in Cancer and Aging

Chemical Biology of DNA damage and repair.

Wnt Signaling in Development and Disease

Neuronal-microglial interactions in the central nervous system

Department of Physiology and Biophysics

Mark Bowen

W. Todd Miller

Suzanne Scarlata

Ilan Spector

Hsien-yu Wang

Thomas White

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

Tyrosine phosphorylation and signal transduction

Cell signaling through heterotrimeric G proteins

Neuronal differentiation and microfilaments

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

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.