Biochemistry and Cell Biology (BCB) MS Program

**Chairperson**  
Aaron Neiman, Life Sciences Building 332 (631) 632-1543

**BCB MS Graduate Program Director**  
Neta Dean, Life Sciences Building 310, (631) 632-9309

**Program Administrator**  
Pam Wolfskill, Life Sciences Building 450, (631) 632-8585

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

For information about the Department of Biochemistry and Cell Biology, please visit http://www.stonybrook.edu/commcms/biochem/index.html

Biochemistry and Cell Biology 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 Web site at http://www.stonybrook.edu/commcms/biochem/education/graduate/bcbms.html

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.

Acceptance by the Graduate Program in Biochemistry and Cell Biology and by the Graduate School.

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**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 Hybridoima 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 pathophysologies: 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

Kevin Czaplinski  
Post-transcriptional control of gene expression in the nervous system

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

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

Jian Cao, M.D.  
Biology and prevention of cancer metastasis

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

Arthur Grollman  
Mechanisms of chemical mutagenesis/carcinogenesis

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

Brookhaven National Laboratory

F. William Studier
Phage T7 replication; large-scale nucleotide sequencing

Cold Spring Harbor Laboratory

Gregory Hannon
Growth control in mammalian cells; post-transcriptional gene silencing

James Hicks
Cancer genomics at the single cell level as a means to understand tumor initiation and evolution and, further, to identify biomarkers for directing cancer therapy

Leemor Joshua-Tor
Structural biology; nucleic acid regulation; RNAi; molecular recognition; X-ray crystallography

Adrian Krainer
mRNA splicing; gene expression; RNA-protein interaction

Robert Martienssen
Plant genetics; transposons; development; gene regulation; DNA methylation

Alea Mills
Cancer; development; aging; senescence; epigenetics

David L. Spector
Spatial organization of gene expression

Arne Stenlund
DNA replication of papillomaviruses

Bruce Stillman
DNA replication and chromatin assembly in human and yeast cells

Nicholas K. Tonks
Characterization of protein tyrosine phosphatases

Lloyd Trotman
The Trotman lab develops and uses the RapidCaP system to study metastatic prostate cancer genomes and their resistance to therapy in vivo.

Christopher Vakoc
Chromatin; epigenetics; acute myeloid leukemia; self-renewal; RNAi screening; mouse models of cancer

Linda Van Aelst
Signal transduction; Ras and Rac proteins, tumorigenesis

Michael H. Wigler
Growth control in yeast and mammalian cells

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