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
Pamela Wolfskill, Life Sciences Building 450, (631) 632-8585

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.

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)
- MCB 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 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

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

Vesicle trafficking and membrane/cytoskeletal interactions

Extracellular degradation by neutrophil proteases

Structure and function of membrane proteins

Chromatin structure and function; gene expression; HATs

Growth factors /signal transduction in early vertebrate development

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.

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

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.

Spectroscopic insights into enzyme mechanisms and structure

Biochemistry; function of the complement system

Bioactive lipids in cancer pathogenesis and therapeutics

Kinase signaling and cell proliferation

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

Bioactive lipids in Inflammation, Aging and Cancer

Vascular functions of Alzheimer’s disease amyloid beta-protein

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

Pathogenesis of spirochetal infections and their host responses

Positive and Negative Regulation of T cell Receptor Signaling

Cell cycle, cyclins, and yeast genetics

Viral/cellular oncogenes; differentiation of erythroid cells

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

Signal transduction, morphogenesis and genetics of pathogenic fungi

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

Cell cycle control and DNA replication in fission yeast
<table>
<thead>
<tr>
<th>Name</th>
<th>Research Area</th>
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<tbody>
<tr>
<td>Erich R. Mackow</td>
<td>Viral Pathogenesis, Regulation of Innate Immunity, Hantavirus, Dengue Virus and Rotavirus Regulation of Cell Signaling Responses, miRNAs and Endothelial cell functions.</td>
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<tr>
<td>Nancy Reich</td>
<td>Cytokine and Innate Immune Responses</td>
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<tr>
<td>Brian Sheridan</td>
<td>Mucosal Immunology, T cell memory, Vaccine design, Host-pathogen interactions</td>
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<tr>
<td>David Thanassi</td>
<td>Secretion of virulence factors by bacterial pathogens; pilus biogenesis by uropathogenic <em>Escherichia coli</em></td>
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<tr>
<td>Adrianus. W.M. van der Velden</td>
<td>Infectious Diseases Immunology; Host Interactions with Bacterial Pathogens; Bacterial Immune Subversion</td>
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<tr>
<td>Eckard Wimmer</td>
<td>RNA virus genetics, replication, pathogenicity, cellular receptors</td>
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<td><strong>Department of Neurobiology and Behavior</strong></td>
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<tr>
<td>Simon Halegoua</td>
<td>Molecular control of the neuronal phenotype</td>
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<tr>
<td>Maurice Kernan</td>
<td>Molecular basis of mechanical senses</td>
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<tr>
<td>Joel Levine</td>
<td>Cell-surface molecules of the developing nervous system</td>
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<tr>
<td>David McKinnon</td>
<td>Molecular physiology of sympathetic neurons and cardiac muscle</td>
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<tr>
<td>Howard Sirotkin</td>
<td>Genetic and molecular analysis of early vertebrate development</td>
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<tr>
<td>Lonnie Wollmuth</td>
<td>Molecular mechanisms of synaptic transmission</td>
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<td></td>
<td><strong>Department of Oral Biology and Pathology</strong></td>
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<tr>
<td>Soosan Ghazizadeh</td>
<td>Epithelial stem cell biology; Skin bioengineering and gene therapy.</td>
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<td><strong>Department of Pathology</strong></td>
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<tr>
<td>Jiang Chen</td>
<td>Skin and hair follicle development, maintenance and malignancy</td>
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<tr>
<td>Howard B. Fleit</td>
<td>Leukocyte Fc receptors; macrophage differentiation</td>
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<tr>
<td>Martha Furie</td>
<td>Host inflammatory response to bacterial infections.</td>
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<tr>
<td>Jingfang Ju</td>
<td>Post-transcriptional control of non-coding RNAs and RNA binding proteins in cancer</td>
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<tr>
<td>Richard R. Kew</td>
<td>Leukocyte chemotaxis/inflammation</td>
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<tr>
<td>Yupo Ma</td>
<td>Stem cell reprogramming and therapy, genome engineering, blood and marrow transplantation</td>
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<tr>
<td>Ute Moll</td>
<td>Tumor suppressor genes; mechanism of p53 inactivation</td>
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<tr>
<td>Kenneth Shroyer</td>
<td>Cancer biomarkers as diagnostic adjuncts in cervical pathology and cytopathology; cervical cancer and HPV</td>
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<tr>
<td>Eric Spitzer</td>
<td>Molecular biology of Cryptococcus neoformans</td>
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<td><strong>Department of Pharmacological Sciences</strong></td>
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<tr>
<td>Adan Aguirre</td>
<td>Stem cell biology in the central nervous system and neurobiology in health and disease</td>
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<tr>
<td>Daniel Bogenhagen</td>
<td>Mitochondrial DNA; DNA repair</td>
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<tr>
<td>Holly Colognato</td>
<td>Extracellular matrix in the brain; roles during development and during neurodegeneration.</td>
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<tr>
<td>Miguel Garcia-Diaz</td>
<td>Genetic Toxicology/Mechanisms of mitochondrial gene expression</td>
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<tr>
<td>Craig C. Malbon</td>
<td>Heterotrimeric G-proteins in development and cancer</td>
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<tr>
<td>Joav Prives</td>
<td>Cytoskeletal membrane interactions in muscle cells</td>
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<tr>
<td>Jessica C. Seeliger</td>
<td>We are applying biochemical, microbiological and biophysical methods to fundamental questions in bacterial membrane biogenesis</td>
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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.*