Description of the Program

The department of Biochemistry & Molecular Biology (BCMB) is in the Franklin College of Arts and Sciences. The College offers both MS and PhD degrees in a variety of scientific disciplines, including Biochemistry and Molecular Biology.

Graduate students are usually admitted at the beginning of fall semester, but in special cases a student with previous experience may be admitted in January. **Deadline for all fellowships and assistantships is January 1**, but exceptional qualifications may lead to awards at other times.

In addition to the courses listed in the curriculum (see http://www.bmb.uga.edu), a number of interdisciplinary courses are available to interested students in the BCMB program. The listings in Biology, Botany, Cellular Biology, Genetics and Microbiology should be consulted to determine the range of courses available to graduate students majoring in Biochemistry and Molecular Biology; see http://www.gradsch.uga.edu for the online graduate bulletin.

For additional questions/concerns about the program, please contact the Biochemistry and Molecular Biology Graduate coordinator (Dr. Alan Przybyla; przybyla@bmb.uga.edu, 706-542-1728).

Degree Descriptions

**MS**

In general, the MS is completed in 2-4 years of full time attendance. The Graduate School specifies that all requirements for this degree be completed within six years, beginning with the first registration for graduate courses included on the final program of study.

**Ph.D.**

Students entering the doctoral program with a bachelor’s degree usually require 4-6 years of full time work. Students entering the program with a Master’s degree usually require 3-4 years of full time work. The Graduate School specifies that all requirements for this degree, except the dissertation and final oral defense, be completed within a period of six years dating from the time of first registration for graduate courses on the final program of study.
Departmental Research Areas

The Department of Biochemistry and Molecular Biology hosts a wide range of research that is funded by NIH, NSF, DOD, and various other federal and private funding agencies.

**AGING AND DEVELOPMENT**
- Cancer Biology
- Alzheimer's Disease
- Arthritis and Joint Diseases
- Cataracts
- Emphysema

**BIOINFORMATICS**
- Genomics and Proteomics
- Computational Biology

**CELL BIOLOGY AND SIGNAL TRANSDUCTION**
- Biosynthesis
- Cell Cycle
- Signal Transduction

**COMPLEX CARBOHYDRATES / GLYCOBIOLOGY**
- Animal Glycoconjugates
- Medical glycobiology
- Microbial and Plant Polysaccharides
- Structural Biology of Carbohydrates

**ENZYMES AND MECHANISMS**
- Glycosyl Transferases
- Metalloenzymes
- Thermophilic Enzymes

**MEDICAL BIOCHEMISTRY**
- Diabetes
- Endocrinology
- Genetic Diseases / Gene Therapy
- Human Diseases - Cystic Fibrosis, HIV, Porphyrin
- Bacterial Infection

**PHYSICAL BIOCHEMISTRY**
- Bioluminescence / Fluorescence
- Biophysical Methods

**PLANT BIOCHEMISTRY**
- Cell Walls
- Development
- Metabolism

**RNA: STRUCTURE / METABOLISM / CATALYSIS**
- Ribozymes
- RNA Processing / Trafficking
- Transcription

**STRUCTURAL BIOLOGY**
- Crystallography
- Mass Spectrometry
- Molecular Modeling
- NMR

**THERMOPHILIC ORGANISMS**
- Metabolism and Bioenergetics

Inter-Departmental Research Areas

The faculty of Biochemistry and Molecular Biology are engaged in various inter-departmental efforts, including:

**THE BIOMEDICAL HEALTH SCIENCES INSTITUTE (BHSI)** facilitates and promotes interdisciplinary research and instructional efforts at UGA in the fields of biomedical and health sciences with the goal of improving the understanding of human health and disease.

**THE CENTER FOR BIOLOGICAL RESOURCES RECOVERY** conducts basic research in areas related to the use of microorganisms in biotechnology and in solving environmental and ecological problems.

**THE NORTHEAST GEORGIA CANCER CENTER (NEGCC)** is a multidisciplinary research center integrating campus, community, and state resources for the basic research, education, prevention, and treatment of cancer.

**THE CENTER FOR METALLOENZYME STUDIES (CMS)** consists of numerous University of Georgia faculty from various disciplines and departments, all of whom have research interests in the study of metals in biology.

**THE COMPLEX CARBOHYDRATE RESEARCH CENTER (CCRC)** conducts basic research to study the structure and function of complex carbohydrates, and trains scientists from the U.S. and around the world in the principles, methods, and analytical techniques used to study complex carbohydrates.

**THE COMPUTATIONAL CENTER FOR MOLECULAR STRUCTURE AND DESIGN (CCMSD)** focuses on understanding molecular structures and interactions, as well as developing new computational procedures (primarily in the area of molecular mechanics and molecular modeling methods).

**THE GEORGIA X-RAY CRYSTALLOGRAPHY CENTER** aims to develop new approaches and techniques in X-ray crystallography for an improved understanding of how structure relates to function in biological macromolecules.

**THE PLANT CENTER** is focused on the cellular and molecular aspects of plant growth and development, plant genome organization and function, the application of molecular and genetic tools to improve cultivated plants, and in understanding organisms that interact with plants.

**THE SOUTHEAST COLLABORATORY FOR STRUCTURAL GENOMICS (SECSG)** is one of seven original pilot centers for structural genomics established by the NIH. It aims to develop, integrate, and test all of the constituents for carrying out cost-effective and high throughput structural genomics research.

**THE SOUTHEAST COLLABORATORY FOR HIGH-FIELD BIOMOLECULAR NMR** is an inter-institutional resource dedicated to the development and application of new NMR methods for biomolecular studies. It provides 900 MHz NMR access in addition to existing 800 MHz access.
Facilities

The Department is housed, along with the Department of Genetics, in the Life Sciences building, a state-of-the-art laboratory complex. In addition to 80 modern research laboratories, the building contains teaching laboratories, administrative areas, lecture rooms, a scientific library, extensive animal quarters, a fermentation facility, and a fiber optic network.

The building also houses the Molecular Genetics Instrumentation Facilities, a support facility that provides various laboratory services, including DNA and peptide sequencing and synthesis, chromatography, mass spectrometry, automated proteomics services (high-throughput two-dimensional gel electrophoresis, multi-dimensional chromatography), and automated genomics services (microarray printing, single-nucleotide polymorphism analysis). Additional support facilities available at the University include a modern microscopy facility, a monoclonal antibody facility, a computer center, a glassblowing shop, a machine shop, and greenhouses.

The Department is conveniently located close to the University’s Science Library which houses approximately 850,000 volumes of the total University holding of more than 2.7 million volumes (ranked 26th among all U.S. research libraries). The library subscribes to a wide range of scientific journals, and many of these can be accessed electronically.

Location and Quality of Life

The University of Georgia is located in historic Athens, a town of about 100,000 permanent residents. Athens is approximately an hour’s drive east of Atlanta, a two-hour drive from the north Georgia mountains and the Appalachian trail, and a five-hour drive from the Atlantic and Gulf coasts. Numerous outdoor activities can be found in and around the Athens area.

The multi-cultural flavor of Athens is reflected by the wide range of restaurants that serve the community - Caribbean, Chinese, Greek, Italian, Jamaican, Japanese, Mexican, and Thai - and the many festivals, events, and outdoor concerts that are hosted by the city, often in conjunction with the University. The Athens’ music scene is vibrant, having been the birthplace of internationally known music groups - B-52’s and REM. The University also draws nationally renowned exhibits, performances, and concerts through the School of Music, the University Theater, and the Georgia Museum of Art.

The athletic facilities at the University of Georgia are among the nation’s best. These facilities support several nationally ranked collegiate sports teams, have been used as Olympic venues, and are generally open to students for recreational use.

Application and Admission

General Requirements

Requirements for admission to graduate study in Biochemistry and Molecular Biology (BCMB) include a bachelor's degree from an accredited institution and the equivalent of an undergraduate major in Biochemistry, Chemistry, or another biological science. Students with majors in other areas are strongly encouraged to apply, with the understanding that deficiencies will be eliminated in the first year of residence.

How to Apply

Apply online at http://www.gradsch.uga.edu or contact one of the following:

• the BCMB Graduate Coordinator (Dr. Alan Przybyla przybyla@bmb.uga.edu)
• the Department of Biochemistry and Molecular Biology
• the University of Georgia Graduate School

You must submit:

• Official transcripts of all colleges and universities attended.
• Official Graduate Record Examination scores. Only the verbal and quantitative portions are required; arrangements for the GRE may be made through the Educational Testing Service, Box 555, Princeton, NJ 08540.
• TOEFL and TSE scores for foreign applicants.
• Three letters of recommendation by persons familiar with your academic credentials, training, and research potential.

When to Apply

The majority of graduate students enter the program in the fall semester (August) of each year, as the core curriculum is offered chronologically beginning in the fall. Some exceptions are made for those with a strong biochemistry background or an MS degree from an accredited institution. The application deadline for financial support is January 1st, but occasionally, funding can be arranged at a later date for excellent candidates.

Admission

The Graduate Affairs Committee determines admission to the BCMB Graduate Program. Admission guidelines are fairly flexible. In general it is expected that prospective students have a minimum GPA of 3.0, combined verbal and quantitative GRE score of 1200, and excellent letters of recommendation. Foreign applicants must have competitive TOEFL and TSE scores. Other considerations such as laboratory experience, publication record, prior degrees, etc., may negate deficiencies in the three primary areas.
Financial Support

The Department of Biochemistry and Molecular Biology makes every effort to provide financial support to graduate students that are enrolled full time in the M.S. or Ph.D. programs. Primary sources of support include university fellowships, and research and teaching assistantships. Students are also encouraged to obtain extramural fellowship support.

All applicants are considered for of the financial support possibilities described below:

**Presidential Graduate Fellowships** are aimed at exceptionally qualified students. This highly competitive award guarantees 5 years of support with a competitive annual stipend and a tuition waiver. Only citizens and legal permanent residents are eligible.

**Graduate School Assistantships** provide two years of support and are intended to allow students to develop their own research programs. After two years, students are typically supported by departmental research assistantships. One-third time service is required, and out-of-state fees are waived. Students are expected to provide 15 hours a service to the department each week in a way to be determined by the student, graduate coordinator, and chairman.

**Departmental Research Assistantships** are usually one-third time research positions that are supported by grants to individual faculty in this and other departments. Out-of-state fees are waived for research assistants who perform at least one-third time service. Applications for research assistantships are made directly to individual faculty members (invariably the prospective major professor).

**Departmental Teaching Assistantships** are awarded on a competitive basis by the Department. These assistantships carry a stipend for a twelve-month appointment. Out-of-state fees are waived for teaching assistants who perform at least one-third time service.

Generally, students in the Biochemistry and Molecular Biology graduate program are provided with annual stipends that are in line with the guidelines set forth by the National Institutes of Health and other federal funding agencies. The Southeast region enjoys a low cost of living, making these stipends of greater economic value than those offered elsewhere.

Faculty

**Adams, Michael W. W.**  
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Office: B216B Life Sciences, Phone: 542-2060  
Lab: B218 / A228 Life Sciences, Lab Phone: 542-1909 / 542-3023  
*Research*: Genomics, metabolism and enzymology of hyperthermophiles, organisms that grow near 100°C.

**Adang, Michael J.**  
E-mail: adang@arches.uga.edu  
Office: 427 Biological Sciences, Phone: 542-2436  
Lab: 427 / 432 Biological Sciences, Lab Phone: 542-2255  
*Research*: Characterization of *Bacillus thuringiensis* toxins and receptors in insect midgut membranes.

**Albersheim, Peter**  
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*Research*: Structures and functions of biologically active plant cell wall oligo- and polysaccharides.

**Black, Clanton C.**  
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*Research*: Structures and functions of the noncellulosic polysaccharides of plant primary cell walls.

**Brewer, John M.**  
E-mail: brewer@bmb.uga.edu  
Office: A314A Life Sciences, Phone: 542-1773  
Lab: A316 Life Sciences, Lab Phone: 542-1776  
*Research*: Understanding the C4 pathway of photosynthesis, the daily regulation of Crassulacean acid metabolism, and sucrose metabolism in plants.

**Carlson, Russell W.**  
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Office: 2043 CCRC, Phone: 542-4439  
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*Research*: The structures and roles of bacterial glycoconjugates in microbe-plant and -animal interactions.

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*Research*: Structures and functions of the noncellulosic polysaccharides of plant primary cell walls.

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*Research*: Protein phosphorylation in budding yeast.
Lanzilotta, William N.
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Lab: A130 Life Sciences, Lab Phone: 542-1573
Research: Crystallographic investigation of nutrient sensing, transport, and metabolism by enteric pathogens.

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Lab: A116 Life Sciences / A126 Life Sciences, Lab Phone: 542-1764
Research: Mechanism and structure of bioluminescence proteins.

Prestegard, James H.
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Research: Glycosyltransferase regulation of tumor cell adhesion and invasion; structure / function of lectins.

Przybyla, Alan E.
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Office: A420B Life Sciences, Phone: 542-1728
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Research: Our laboratory employs recombinant technology to investigate the role of beta amyloid peptide fibrilization in the onset of Alzheimer's disease.

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Schmidt, Walter K.
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Research: Molecular and biochemical analyses of eukaryotic proteases required for the maturation of prenylated signaling molecules.

Terms, Michael P.
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Research: Biogenesis, transport, and function of cellular RNAs and RNA-based gene therapy agents.

Tiemeyer, Michael
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Research: Structure and function of cell surface carbohydrates in the developing nervous system, genetic control of glycan expression.

Urbauer, Jeff
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Research: Protein structure and function, NMR spectroscopy of proteins, prokaryotic transcription, oxidative stress and calmodulin

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Lab: B202 / B206 Life Sciences, Lab Phone: 542-3384 / 542-3403
Research: Elucidating mechanisms of nutrient sensing in Type II diabetes and cancer mediated by post-translational modification of proteins

Wells, Lance.
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Research: Elucidating mechanisms of nutrient sensing in Type II diabetes and cancer mediated by post-translational modification of proteins

Wood, Robert J.
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Research: Solving biological / biomedical problems with mass spectrometry.

Wright, L. K.
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Office: 3056 CCRC, Phone: 542-1702
Lab: 3059 / 3060 CCRC, Lab Phone: 542-1701
Research: Structure-function studies by X-ray diffraction, transcription proteins, structural genomics, phasing methods.

Xu, Ying
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Lab: A110 / A134 Life Sciences, Lab Phone: 542-9779
Research: Computational molecular biology, bioinformatics focusing on protein structure prediction, biological pathway modeling, and biological data mining.

York, William S.
E-mail: will@ccrc.uga.edu
Office: 3024 CCRC, Phone: 542-4454
Lab: 1092 / 2069, Lab Phone: 542-0263/542-3508
Research: Immunological carbohydrate-protein interactions studied by computational simulation and experimental methods.

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Research: Protein structure and function, NMR spectroscopy of proteins, prokaryotic transcription, oxidative stress and calmodulin

Zhang, Y. Z.
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Office: 3019 CCRC, Phone: 542-2740
Lab: 3024 CCRC, Lab Phone: 542-9740
Research: Structure and function of cell surface carbohydrates in the developing nervous system, genetic control of glycan expression.
Research Faculty Holding Graduate Faculty Appointments

Narayan, Prema
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Office: B320B Life Sciences, Phone: 542-1721
Lab: B322 Life Sciences, Lab Phone: 542-1718
Research: Transgenic mouse models for constitutively active luteinizing hormone receptors.

Rose, John
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Lab: B206 Life Sciences, Lab Phone: 542-3403
Research: X-ray crystallography as applied to structural biology and structural genomics.

Terns, Rebecca
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Lab: A328 Life Sciences, Lab Phone: 542-3520

Distinguished Ph.D. Graduates of the Department


William C. Merrick, Ph.D. (1971). Thesis: Changes in isoaccepting tRNA species during germination of cotton seeds. Current Position: Professor, Dept. of Biochemistry, School of Medicine, Case Western Reserve University, Cleveland, OH.

Michael R. Moore, Ph.D. (1975). Thesis: Isolation and kinetic properties of methylene-tetrahydrofolate dehydrogenase from Clostridium formicoaceticum. Current Position: Professor, Dept. of Biochemistry and Molecular Biology, Marshall University, School of Medicine, Huntington, WV.


The University of Georgia is a unit of the University System of Georgia.

The University of Georgia is an Equal Employment Opportunity/Affirmative Action Institution. The University does not discriminate with respect to employment or admission on the basis of race, color, religion, national origin, age, sex, disability, or veteran status.

If you have a disability and need assistance in order to obtain this brochure in an alternative format, please contact the Department of Biochemistry and Molecular Biology at (706) 542-1334.

November 2003

Cover Photos
Top: Life Sciences Building, University of Georgia.
Middle (bottom, left to right): Surface antigen from group B streptococcus (R. Woods). Ras2p localization in various yeast backgrounds (W. Schmidt). A small section of a plant xyloglucan (W. York).
Bottom: Various images of the University of Georgia.