



Description of the Program

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

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 www.bmb.uga.edu), a number of interdisciplinary courses are available to interested students in the BCMB program. The listings in Biology, Cellular Biology, Genetics, Microbiology, and Plant Biology should be consulted to determine the range of courses available to graduate students majoring in BCMB; see www.gradsch.uga.edu for the online graduate bulletin.

For additional questions/concerns about the program, please contact the BCMB Graduate Coordinator, Dr. Alan Przybyla (przybyla@bmb.uga.edu, 706-542-1728).

Degree Descriptions

M.S.

In general, the M.S. is completed in 2 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.

DEPARTMENT OF BIOCHEMISTRY AND MOLECULAR BIOLOGY
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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

- Alzheimer's Disease
- Arthritis and Joint Diseases
- Cataracts
- Cell Adhesion, Differentiation, and Recognition

BIOINFORMATICS

- Computational Biology
- Genomics and Proteomics

CANCER

- Cancer Etiology and Markers
- Drug Design and Efficacy Studies

CELL BIOLOGY AND SIGNAL TRANSDUCTION

- Biosynthesis
- Cell Cycle
- Signal Transduction
- Stem Cell Biology

COMPLEX CARBOHYDRATES / GLYCOBIOLOGY

- Animal Glycoconjugates
- Anti-bioterrorism Studies
- Medical Glycoscience, Biotechnology, and Glycomics
- Microbial and Plant Polysaccharides
- Structural Biology of Carbohydrates

ENZYMES AND MECHANISMS

- General Enzymology
- Glycosyl Transferases and Glycosidases
- Metalloenzymes
- Thermophilic Enzymes

MEDICAL BIOCHEMISTRY

- Bacterial Infection
- Diabetes
- Endocrinology
- Genetic Diseases / Gene Therapy
- Human Diseases - Cystic Fibrosis, HIV, Porphyria

PHYSICAL BIOCHEMISTRY

- Biophysical Method Development
- Hydrodynamics
- Mass Spectroscopy
- NMR

PLANT BIOCHEMISTRY

- Biosynthesis of Polysaccharides
- Photosynthesis and Metabolism
- Plant Development
- Structure/Function of Plant Cell Walls

RNA: STRUCTURE / METABOLISM / CATALYSIS

- Ribozymes
- RNA Processing / Trafficking
- Transcription

STRUCTURAL BIOLOGY

- Crystallography
- Molecular Modeling
- NMR

THERMOPHILIC ORGANISMS

- Metabolism and Bioenergetics

Interdepartmental Research Areas

The faculty of Biochemistry and Molecular Biology are engaged in various interdepartmental 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 CANCER CENTER 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 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 on the structure and function of complex carbohydrates, and trains U.S. and international scientists in the principles, methods, and analytical techniques used to study complex carbohydrates.

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 INSTITUTE OF BIOINFORMATICS provides resources in genomics, proteomics and glycomics.

THE PLANT CENTER investigates 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 the interaction of organisms with plants.

THE RESOURCE FOR INTEGRATED GLYCOTECHNOLOGY is an NIH sponsored resource facility that develops and applies a diverse set of technologies for the study of protein-carbohydrate interactions. It specializes in expression of glycosylated proteins, synthesis of glycoconjugates, mass spectrometric analysis, NMR analysis, and computer modeling of targeted systems.

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 (SECNMR) is an NIH-sponsored inter-institutional resource center dedicated to the development and application of new NMR methods for biomolecular studies. It provides access to high field NMR instrumentation, including 900 MHz NMR, for scientists in the Southeast region of the country.

Facilities

The Department is housed, along with the Department of Genetics, in the Davison 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. Additional laboratories affiliated with the department are located in the Complex Carbohydrate Research Center (CCRC), which houses 32 modern laboratories and some of the best NMR and mass-spectroscopy facilities in the country. The CCRC is home to three federally designated centers for carbohydrate research.

Additional support facilities available at the University include DNA and peptide sequencing and synthesis, chromatography, mass spectrometry, automated proteomics services (high-throughput two-dimensional gel electrophoresis, multi-dimensional chromatography), automated genomics services (microarray printing, single-nucleotide polymorphism analysis), a modern microscopy facility, a monoclonal antibody facility, mouse and zebrafish facilities, 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 750,000 volumes of the total University holding of more than 3.5 million volumes. 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 110,000 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, Indian, 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.applyweb.com/apply/ugg> or contact one of the following:

- the BCMB Graduate Coordinator, Dr. Alan Przybyla at przybyla@bmb.uga.edu
- the Department of Biochemistry & 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, or see their website for details.
- TOEFL 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 found 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 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 BCMB 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.

Graduate Faculty and Research Interests

Adams, Michael W. W.

E-mail: adams@bmb.uga.edu

Office: B216B Life Sciences, Phone: 706-542-2060

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: 706-542-2436

Research: Characterization of *Bacillus thuringiensis* toxins and receptors in insect midgut membranes.

Albersheim, Peter

E-mail: palbersh@ccrc.uga.edu

Office: 2013 CCRC, Phone: 706-542-4404

Research: Structures and functions of biologically active plant cell wall oligo- and polysaccharides.

Black, Clanton C.

E-mail: ccblack@bmb.uga.edu

Office: A314A Life Sciences, Phone: 706-542-1778

Research: Understanding the C4 pathway of photosynthesis, the daily regulation of Crassulacean acid metabolism, and sucrose metabolism in plants.

Brewer, John M.

E-mail: brewer@bmb.uga.edu

Office: A314B Life Sciences, Phone: 706-542-1773

Research: Relation between enolase subunit association and activity.

Carlson, Russell W.

E-mail: rcarlson@ccrc.uga.edu

Office: 2043 CCRC, Phone: 706-542-4439

Research: The structures and roles of bacterial glycoconjugates in microbe-plant and -animal interactions.

Dailey, Harry A.

E-mail: hdailey@arches.uga.edu

Office: 230 Coverdell, Phone: 706-542-2690

Research: Studies on the regulation of heme synthesis and structure / function of heme pathway enzymes.

Dalton, Stephen

E-mail: sdalton@uga.edu

Office: 245 Coverdell Phone: 706-583-0480

Research: The biology of embryonic stem cells and their use as a therapeutic to cure diabetes and other diseases.

Darvill, Alan

E-mail: adarvill@ccrc.uga.edu

Office: 2020 CCRC, Phone: 706-542-4411

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

DerVartanian, Daniel V.

E-mail: dervar@bmb.uga.edu

Office: A220A Life Sciences, Phone: 706-542-4620

Research: Study of nickel-containing proteins or enzymes from heart tissue as marker for heart attacks.

Glover, Claiborne V. C.

E-mail: glover@arches.uga.edu

Office: A414A Life Sciences, Phone: 706-542-1769

Research: Protein phosphorylation in budding yeast.

Lanzilotta, William N.

E-mail: wlanzilo@bmb.uga.edu

Office: A220B Life Sciences, Phone: 706-542-1324

Research: Crystallographic investigation of nutrient sensing, transport, and metabolism by enteric pathogens

Lee, David C., Vice President of Research

E-mail: dclee@uga.edu

Office: 609 Boyd Graduate Studies, Phone: 706-542-5969.

Mendicino, Joseph F.

E-mail: mendicin@bmb.uga.edu

Office: B210A Life Sciences, Phone: 706-542-3010

Research: Role of glycosyltransferases and sulfotransferases in the pathology of Cystic Fibrosis.**Mohnen, Debra**

E-mail: dmohnen@ccrc.uga.edu

Office: 2044 CCRC, Phone: 706-542-4458

Research: Biosynthesis and function of the plant cell wall polysaccharide pectin and the effects of pectin on human health.**Moremen, Kelley W.**

E-mail: moremen@arches.uga.edu

Office: 3055 CCRC, Phone: 706-542-1705

Research: Structure, function, mechanism of action, and regulation of enzymes in mammalian glycoprotein biosynthesis and catabolism.**Orlando, Ron**

E-mail: orlando@ccrc.uga.edu

Office: 1078 CCRC, Phone: 706-542-4429

Research: Solving biological / biomedical problems with mass spectrometry.**Pierce, J. Michael**

E-mail: hawkeye@arches.uga.edu

Office: 3056 CCRC, Phone: 706-542-1702

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

E-mail: jpresteg@ccrc.uga.edu

Office: 1077 CCRC, Phone: 706-542-6281

Research: Application of nuclear magnetic resonance spectroscopy to the characterization of biologically important systems.**Przybyla, Alan E.**

E-mail: przybyla@bmb.uga.edu

Office: A420B Life Sciences, Phone: 706-542-1728

Research: Our laboratory employs recombinant technology to investigate the role of beta amyloid peptide fibrilization in the onset of Alzheimer's disease.**Puett, J. David**

E-mail: puett@bmb.uga.edu

Office: B302B Life Sciences, Phone: 706-542-0004

Research: Molecular & cellular biochemical endocrinology emphasizing G protein-coupled receptors & tumor biology.**Rose, John**

E-mail: rose@bcl4.bmb.uga.edu

Office: B204B Life Sciences, Phone: 706-542-1750

Research: X-ray crystallography as applied to structural biology and structural genomics.**Schmidt, Walter K.**

E-mail: wschmidt@bmb.uga.edu

Office: A414B Life Sciences, Phone: 706-583-8241

Research: Molecular and biochemical analyses of eukaryotic proteases required for the maturation of prenylated signaling molecules.**Terns, Michael P.**

E-mail: mterns@bmb.uga.edu

Office: A326B Life Sciences, Phone: 706-542-1896

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

E-mail: mtiemeyer@ccrc.uga.edu

Office: 3019 CCRC, Phone: 706-542-2740

Research: Structure and function of cell surface carbohydrates in the developing nervous system, genetic control of glycan expression.**Urbauer, Jeffrey L.**

E-mail: urbauer@chem.uga.edu

Office: A308 Life Sciences, Phone: 706-542-7922

Research: Protein structure and function, NMR spectroscopy of proteins, prokaryotic transcription, oxidative stress and calmodulin**Wang, B. C.**

E-mail: wang@bcl1.bmb.uga.edu

Office: B204A Life Sciences, Phone: 706-542-1747

Research: Structure-function studies by X-ray diffraction, transcription proteins, structural genomics, phasing methods.**Wells, Lance**

E-mail: lwells@ccrc.uga.edu

Office: 3018 CCRC, Phone: 706-542-7806

Research: Elucidating mechanisms of nutrient sensing in Type II diabetes and cancer mediated by post-translational modification of proteins**Woods, Robert J.**

E-mail: rwoods@ccrc.uga.edu

Office: 1089 CCRC, Phone: 706-542-4454

Research: Immunological carbohydrate-protein interactions studied by computational simulation and experimental methods.**Xu, Ying**

E-mail: xyn@bmb.uga.edu

Office: A108A Life Sciences, Phone: 706-542-9779

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: 2081 CCRC, Phone: 706-542-4628

Research: Molecular dynamics and topology of polysaccharide networks in the cell walls of higher plants.**Zhao, Shaying**

E-mail: szhao@bmb.uga.edu

Office: B314B Life Sciences, Phone: 706-542-9147

Research: Genomic rearrangements, gene structure and expression alterations during genome evolution and human cancer development.**Research Faculty With Graduate Faculty Status****Bergmann, Carl**

E-mail: cberg@ccrc.uga.edu

Office: 2089 CCRC, Phone: 706-542-4487

Research: Structure and function of proteins that interact with anionic extracellular matrix polysaccharides in plants and animals.**Terns, Rebecca**

E-mail: rterns@bmb.uga.edu

Office: A326 Life Sciences, Phone: 706-542-1703

Research: Assembly/transport of RNA-protein complexes implicated in cancer and neuromuscular disease; analysis of related complexes in archaea.

Distinguished Ph.D. Graduates of the Department

James N. Ihle, Ph.D. (1971)

Thesis: Regulation of enzyme synthesis during embryogenesis and germination of cotton.
Current Position: Professor and Chair – Biochemistry Dept., St Jude Children's Research Hospital, Memphis, TN.

D. Mack Ivey, Ph.D. (1987)

Thesis: Generation of energy during CO₂ fixation in acetogenic bacteria.
Current Position: Assoc. Professor, Dept. of Biological Sciences, University of Arkansas.

Richard McCann, Ph.D. (1995)

Thesis: Identification and characterization of CKM1 and CDC37 as physiological partners of *Saccharomyces cerevisiae* casein kinase II. *Current Position:* Assist. Professor, Dept. of Biochemistry, University of Kentucky.

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.

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.

William E. O'Brien, Ph.D. (1971)

Thesis: The synthesis of acetate from carbon dioxide by *Clostridium formicoaceticum*. *Current Position:* Professor, Dept. of Molecular and Human Genetics, Baylor College of Medicine.

Ramesh Padmanabha, Ph.D. (1989)

Thesis: A biochemical and genetic analysis of yeast casein kinase II. *Current Position:* Senior Research Scientist, Bristol Myers-Squibb.

Stephen W. Ragsdale, Ph.D. (1983)

Thesis: Electron transfer reactions involved in acetogenic bacteria. *Current Position:* Professor, Dept. of Biochemistry, University of Nebraska.

Craig Reed, Ph.D. (1995)

Thesis: Biochemical and molecular genetic analysis of casein kinase II regulatory subunit function. *Current Position:* Project Manager, Chemical and Biological Defense Division, Southern Research Institute.

Christopher F. Reilly, Ph.D. (1982)

Thesis: The structural and functional characteristics of human leukocyte cathepsin G. *Current Position:* Vice President, AstraZeneca.

Richard R. Sinden, PhD (1978)

Thesis: On the mechanism of genetic recombination in *E. coli* – topography, kinetics, and genetic control of recombination during the repair of cross-linked DNA. *Current Position:* Associate Director, Institute of Biosciences and Technology, Dept. of Medical Biochemistry and Genetics, College of Medicine, Texas A&M University System Health Science Center.

Sangram Sisodia, Ph.D. (1985)

Thesis: Structural and functional comparison of nucleic acid helix destabilizing protein and lactate dehydrogenase 5 of rat. *Current Position:* Thomas Reynolds Sr. Family Professor of Neurosciences and Director - The Center for Molecular Neurobiology, The Univ. of Chicago.

William S. York, Ph.D. (1996)

Thesis: Development and application of spectroscopic methods for the structural analysis of xyloglucans and xyloglucan oligosaccharides. *Current Position:* Assistant Professor, Dept. of Biochemistry and Molecular Biology, University of Georgia.



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.

May 2006

Cover Photos

Top:
Life Sciences Building, University of Georgia.

Middle (top, left to right):
Ribbon diagram of GnT-V (J. Prestegard).
P. furiosus microarray data (M. Adams).
Telomerase RNA diagram (M. Terns).

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.