

BIOCHEMISTRY AND MOLECULAR BIOLOGY (BMB)

Interdisciplinary Major

This interdisciplinary Bachelor of Science major, jointly offered by the Departments of Biology and Chemistry, provides a strong foundation in biological chemistry and molecular biology, and related topics at the interface of these two disciplines. The major is designed to build conceptual understanding and practical and critical thinking skills to address current biological, biochemical, and biomedical challenges. A required research experience spanning multiple semesters, culminating in a senior project, will give students strong experimental skills and provide insight into biochemical and molecular biological experimental approaches and results that demonstrate the function of biological molecules. To graduate with a biochemistry and molecular biology major, students must have a minimum GPA of 2.0 in required and elective BIO, BMB, and CHM courses taken at Wake Forest. At the time of major declaration, students will select a major concentration either in biochemistry or in molecular biology. Policies for transfer credits are set by the biology and chemistry departments, as outlined in their bulletin sections.

Contact Information

Biochemistry and Molecular Biology (<http://college.wfu.edu/biology/undergraduate/biochemistry-and-molecular-biology-bmb/>)
Wake Downtown Main Office
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Programs Major

- B.S. in Biochemistry and Molecular Biology (<https://bulletin.wfu.edu/courses-instruction/biochemistry-molecular-biology/bs-biochemistry-molecular-biology/>)

Courses

Biochemistry and Molecular Biology (BMB)

BMB 301. Special Topics in Biochemistry and Molecular Biology. (3 h)

Courses in selected special topics in biochemistry and molecular biology. May be repeated for credit if course content differs. P - POI.

BMB 370. Biochemistry I: Macromolecules and Metabolism. (3 h)

Introduces principles of biochemistry including structure, function, and biosynthesis of biological molecules, analysis of enzyme function and activity, bioenergetics, and regulation of metabolic pathways. Also listed as BMB 370 and CHM 370. P-any two of the following with associated labs: CHM 122 (or CHM 123), CHM 280 or BIO 214; or any two of the following: CHM 122 (or CHM 123), CHM 280, or BIO 265.

BMB 371L. Advanced Biochemistry Lab. (1.5 h)

Emphasizes approaches for isolation and analysis of enzymes. Required for BMB major and the chemistry major with concentration in biochemistry. Recommended for research focused students. Also listed as BIO 371L and CHM 371L. Credit allowed for BIO 370L/CHM 370L, or BMB 371L/BIO 371L/CHM 371L, but not both. P or C-BMB 370/BIO 370/CHM 370.

BMB 372. Advanced Molecular Biology. (3 h)

Presents molecular mechanisms by which stored genetic information is expressed including the mechanisms for and regulation of gene expression, protein synthesis, and genome editing. Emphasizes analysis and interpretation of experimental data from the primary literature. Also listed as BIO 372. P-BIO 213 and 214 and BIO 370/BMB 370/CHM 370 or BIO 265 and BIO 370/BMB 370/CHM 370.

BMB 372L. Advanced Molecular Biology Laboratory. (1.5 h)

Introduces modern methods of molecular biology to analyze and manipulate expression of genes and function of gene products. Also listed as BIO 372L. P or C-BIO 372/CHM 372 or BMB 373/CHM 373.

BMB 373. Biochemistry II. (3 h)

Examines the structure, function, and synthesis of proteins and nucleic acids and includes advanced topics in biochemistry including catalytic mechanisms of enzymes and ribozymes, use of sequence and structure databases, and molecular basis of disease and drug action. Also listed as CHM 373. P-CHM 223 and BIO 370/BMB 370/CHM 370.

BMB 376. Biophysical Chemistry. (3 h)

Fundamentals of physical chemistry applied to biological molecules, including thermodynamics, kinetics, quantum mechanics, and spectroscopy. Emphasizes modern experimental approaches used to analyze biological systems. Also listed as CHM 376. P-CHM 280, BIO/BMB/CHM 370, PHY 114. P or C-MST 112.

BMB 381. Epigenetics. (3 h)

Studies the molecular mechanisms for inheritance of genome modifications. Uses primary literature to explore the environmental and developmental signals that influence epigenetic controls of gene expression and disease. Also listed as BIO 381. P-BIO 213 and 214 or BIO 265.

BMB 381L. Epigenetics Laboratory. (1 h)

Lab provides hands-on experiences with genome editing and molecular genetics to address the function and expression of genes. Also listed as BIO 381L. P or C-BMB 381 or POI.

BMB 382. Molecular Signaling. (3 h)

Examines the molecular and biochemical mechanisms by which hormones, neurotransmitters, and other signaling molecules act to change growth, development, and physiological and behavioral responses of organisms with a focus on discussion of primary literature. Also listed as BIO 382. P-BIO 213, 214, and BIO 370/BMB 370/CHM 370 or BIO 265 and BIO 370/BMB 370/CHM 370.

BMB 383. Genomics. (3 h)

Examines the architecture, expression, and evolution of genomes. Uses current primary literature to examine the functional and evolutionary dynamics of genomes and the modern analytic techniques used to investigate genome-wide phenomena. Also listed as BIO 383. P-BIO 160 and 160L or CSC 112 or STA 212; and an introductory statistics course such as STA 111, ANT 380, BIO 380, or PSY 311.

BMB 383L. Genomics Lab. (1 h)

Introduces analytic methods and interpretation of genome-wide data through practical tutorials. Also listed as BIO 383L. P or C-BMB 383.

BMB 388. Senior Seminar in Biochemistry and Molecular Biology. (1 h)

Discussion of contemporary research and introduction to the biochemical and molecular biology literature and research skills and approaches. P or C-BMB 370/BIO 370/CHM 370.

BMB 390. Biochemistry and Molecular Biology Research Experience. (0-2 h)

Research experience and written report for off campus or summer research by prearrangement. Pass/Fail option. May be repeated for credit. Summer research for 0 h is pass/fail only.

BMB 391. Independent Research. (0.5-2 h)

Working under the guidance of a faculty member or research staff member, students will conduct an independent research project that involves the collection and analysis of data, and that culminates in a written paper or poster to be submitted to the sponsoring faculty or staff member. P-POI.

BMB 392. Independent Research. (0.5-2 h)

Working under the guidance of a faculty member or research staff member, students will conduct an independent research project that involves the collection and analysis of data, and that culminates in a written paper or poster to be submitted to the sponsoring faculty or staff member. P-POI.

BMB 393. Independent Research. (0.5-2 h)

Working under the guidance of a faculty member or research staff member, students will conduct an independent research project that involves the collection and analysis of data, and that culminates in a written paper or poster to be submitted to the sponsoring faculty or staff member. P-POI.

BMB 394. Independent Research. (0.5-2 h)

Working under the guidance of a faculty member or research staff member, students will conduct an independent research project that involves the collection and analysis of data, and that culminates in a written paper or poster to be submitted to the sponsoring faculty or staff member. P-POI.

BMB 395. Senior Research Project. (2 h)

Writing of senior research project or honors thesis. P or C-two of the following: BMB 390/BMB 391/BIO 391/CHM 391, BMB 392/BIO 392/CHM 392.

Faculty

Program Coordinator:

Gloria Muday, Charles M. Allen Professor of Biology

Core Faculty:

Rebecca Alexander, Professor of Chemistry

Erik C. Johnson, Professor of Biology

Lindsay Comstock, Associate Professor of Chemistry

Patricia Dos Santos, Associate Professor of Chemistry

Sarah McDonald, Associate Professor of Biology

Ke Zhang, Associate Professor of Biology

Matthew J. Fuxjager, Assistant Professor of Biology

James B. Pease, Assistant Professor of Biology

Troy Stich, Assistant Professor of Chemistry

Diana R. Arnett, Assistant Teaching Professor of Biology

Heather Brown-Harding, Assistant Director of Microscopy