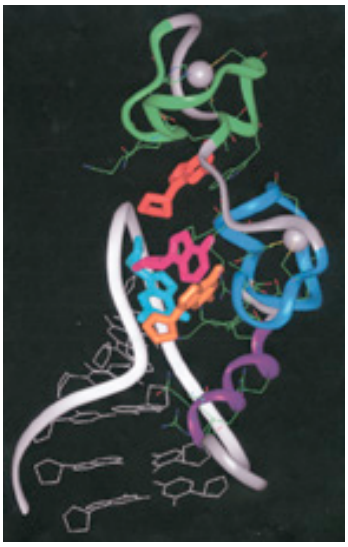
BIOCHEMISTRY



Biochemistry is the study of the molecular basis of life. Lying at the interface between chemistry and biology, biochemistry is concerned with the structure and interaction of proteins, nucleic acids, and other biomolecules as related to their function in biological systems. As one of the most dynamic areas of science, biochemistry has led to improved medicines and diagnostic agents, new ways of controlling disease, and greater understanding of the chemical factors that control our general health and well-being.

The Bachelor of Science degree in biochemistry is appropriate for students pursuing advanced degrees in biochemistry, molecular biology, and biophysics as well as in the biomedical fields and health professions.

Before declaring the biochemistry major, students must earn at least 30 credits in courses graded A-F at Syracuse, and earn at least a grade of C+ in CHE 275 and BIO 326 or 327.

Faculty J. Belote, P. Borer, M. Braiman, S. Chan, J. Chaiken, A. Chakraborty , J. Chisholm, D.A. Clark, M.S. Cosgrove, J. Dabrowiak, R. Doyle, T. Fondy, T. Freedman, A. Garza, J. Goodisman, B. Hudson, J. Kallmerten, T. Korter, Y.-Y. Luk, E. Maine, M.M. Maye, L. Nafie, M. Pepling, R. Raina, K. Ruhlandt, J. Russell, N. Totah, R. Welch, J. Zubieta.

DISTINCTION IN BIOCHEMISTRY

The biochemistry B.S. program encourages all of its students to participate in research through its BCM 460 course. For students whose research culminates in a written thesis, it is possible to graduate with Distinction in Biochemistry if the following requirements are met.

First, the student must have a transcript showing an overall cumulative GPA of 3.4, and much also have a minimum cumulative GPA of 3.4 in all natural sciences and mathematics courses taken at S.U.

Second, the student must have taken a minimum of 6 credits of BCM 460.

Third, before completion of the final semester at Syracuse University, the student must make an oral presentation (either poster or platform) based on his/her research, at one of the following: (1) the Syracuse University biology department Undergraduate Research Conference in April; or (2) an external conference sponsored by an outside (non-S.U.) educational institution with its own accredited 4-year biochemistry degree program; or (3) an external conference sponsored by a nationally-recognized scientific society with a biochemistry component (e.g. ACS, FASEB, Biophysical Society). A symposium specifically designed for undergraduate researchers from multiple institutions and sponsored by a regional or local chapter of a national scientific society is understood to qualify as external, even if it is physically located at Syracuse University.

Fourth, the written thesis must be judged to be of high quality by a committee of readers selected from among the biochemistry program faculty listed in the *Syracuse University Course Catalog*. The student is responsible for selecting potential readers and obtaining their consent to serve. The committee of readers should include the research supervisor, but in any case must include at least one member whose primary appointment is in Syracuse University's biology department, and one member whose primary appointment is in Syracuse University's chemistry department.

For further information, contact the biochemistry major advisors.

Contact James C. Dabrowiak, 2-016D Center for Science and Technology, 443-4601; *jcdabrow@syr.edu* or Samuel H. Chan, 310 Biology Research Lab, 443-3182, *shchan@syr.edu*.

B.S. DEGREE REQUIREMENTS FOR BIOCHEMISTRY

Highlighted items pending approval by College and University

Core Courses (49-60 credits)

□ BIO 121/123 *or* BIO 200: General Biology I/II (8)
or Advanced Placement Biology Credit (6)
□ CHE 106/107 *or* 109/119: General Chemistry I/Lab (4)[1]
□ CHE 116/117 *or* 129/139: General Chemistry II/Lab (4)[1]
□ CHE 275/276: Organic Chemistry I/Lab (5)
□ CHE 325/326: Organic Chemistry II/Lab (5)
□ MAT 285 *or* 295: Calculus I (3-4)
□ MAT 286 *or* 296: Calculus II (3-4)
□ PHY 211/221: General Physics I/Lab (4)
□ PHY 212/222: General Physics II/Lab (4)
□ BIO 326: Genetics and Cell Biology I (3)
□ BIO 327: Genetics and Cell Biology II (3)
□ CHE 474: Structural and Physical Biochemistry (3)
□ BIO 475 *or* CHE/BCM477: Biochemistry Lab* *or*
Preparation and Analysis of Proteins
and Nucleic Acids Lab (3)*,[2]
□ BIO 575: Biochemistry I (3)
□ BIO 576: Biochemistry II (3)

Elective Courses (At least 12 credits, including at least one instructional lab indicated with an asterisk) [2]

□ CHE 335: Chemical and Biochemical Analysis Lab (4)*
□ CHE 346: Physical Chemistry I (3)
□ CHE 356: Physical Chemistry II (3)
□ BIO 409: Microbiology (4)*
□ BIO 422: Bioinformatics for Life Sciences w/Lab (3)*
□ BIO 425: Cell and Development Biology Lab* (3)
□ CHE 412: Metals in Medicine (3)
□ BCM 430: Journal Club in Molecular Pharmacology and
Structural Biology (1)
□ BIO 447: Immunobiology (3)
□ BCM 460: Research in Biochemistry (3) [3]
□ BIO 462: Molecular Genetics (3)
□ BIO 463: Molecular Biotechnology Lab (4)*
□ BIO 464: Applied Biotechnology Lab (4)*
□ BIO 465: Molecular Biology Lab (3)*
□ BCM 484/684: Biomolecular Modeling w/Lab (3)*
□ BIO 501: Biology of Cancer (3)
□ BIO 503: Developmental Biology (3)
□ BIO 518: Endocrinology (3)
□ CHE 546: Molecular Spectroscopy and Structure (1-3)
□ CHE 575: Organic Spectroscopy (3)
□ BIO 595: Molecular Biology and Evolution (3)
□ BIO 622: Cell and Molecular Biology I (3)
□ BIO 623: Cell and Molecular Biology II (3)

[1] Students with a score of 5 on the AP chemistry exam who complete CHE 275/276 during their first semester at SU, and who also take CHE 325/326 and CHE 474 at SU, are thereby exempt from the requirement to take CHE 106/107 and CHE 116/117 (or their honors equivalents) for the biochemistry B.S. degree. *Note, however, that the resulting program may not include enough CHE courses to formally satisfy pre-med requirements of certain medical schools.*

[2] If both BIO 475 and CHE/BCM 477 are taken, one may count toward the 12-credit elective requirement, thereby also meeting the instructional lab requirement.

[3] BCM 460 counts once (up to 3 credits) towards elective requirement, but does not count as an instructional lab course.

RECOMMENDED ELECTIVES

Preparation for Graduate School in a Dept. of Biology, Biochemistry, or Molecular Biology

□ BIO 409: Microbiology
□ CHE 412: Metals in Medicine
□ BCM 430: Journal Club in Molecular Pharmacology and
Structural Biology
□ BIO 447: Immunobiology
□ BCM 460: Research in Biochemistry[3]
□ BIO 462: Molecular Genetics
□ BIO 463: Molecular Biotechnology Lab (4)
□ BIO 464: Applied Biotechnology Lab (4)
□ BIO 465: Molecular Biology Lab
□ BCM 484: Biomolecular Modeling
□ BIO 501: Biology of Cancer
□ BIO 503: Developmental Biology
□ BIO 518: Endocrinology

Preparation for Graduate School in a Dept. of Chemistry

□ CHE 335: Chemical and Biochemical Analysis Lab
□ CHE 346: Physical Chemistry I
□ CHE 356: Physical Chemistry II
□ CHE 412: Metals in Medicine
□ BCM 430: Journal Club in Molecular Pharmacology and
Structural Biology
□ BCM 460: Research in Biochemistry[3]
□ BIO 465: Molecular Biology Lab
□ BCM 484: Biomolecular Modeling
□ CHE 546: Molecular Spectroscopy and Structure
□ CHE 575: Organic Spectroscopy

Preparation for Health Professions (M.D., D.D.S., D.V.M.)

□ CHE 412: Metals in Medicine
□ BIO 409: Microbiology
□ BCM 460: Research in Biochemistry[3]
□ BIO 447: Immunobiology
□ BIO 462: Molecular Genetics
□ BIO 465: Molecular Biology Lab
□ BIO 501: Biology of Cancer
□ BIO 503: Developmental Biology
□ BIO 518: Endocrinology

Preparation for Technical Careers in Pharmaceutical or Biotechnical Industry

□ CHE 335: Chemical and Biochemical Analysis Lab
□ BIO 409: Microbiology
□ BIO 447: Immunobiology
□ BIO 462: Molecular Genetics
□ BIO 465: Molecular Biology Lab
□ BCM 460: Research in Biochemistry[3]
□ BIO 463: Molecular Biotechnology Lab (4)
□ BIO 464: Applied Biotechnology Lab (4)
□ BCM 484: Biomolecular Modeling
□ BIO 501: Biology of Cancer
□ BIO 503: Developmental Biology
□ BIO 518: Endocrinology
□ CHE 575: Organic Spectroscopy

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