

Biochemistry

The major in biochemistry is administered by the Biochemistry Committee: Professors Hamilton (chemistry), Hsu (*chair*, biochemistry), Knight (biological sciences), Woodard (biological sciences); Associate Professors Gomez (chemistry), Nunez (chemistry), Stranford (biological sciences).

Contact Persons

Dianne Baranowski, *senior administrative assistant*
Lilian Hsu, *chair*

The major in biochemistry is intended to provide a strong background in the fundamentals of both biology and chemistry and to develop an awareness of the unique principles of biochemistry. The core curriculum consists of Chemistry 101 (or 160), 201, 202, 302, and 308; Biological Sciences 145 (or 160), 200, and 210; and Biochemistry 311 and 314. In addition to these core courses, 8 additional credits of advanced (300-level) work are required. Advanced courses may be elected from 300-level courses offered in biochemistry, biology, and chemistry. This requirement is intended to increase the breadth and depth of your knowledge and application of biochemistry through related 300-level course work. Students who are interested in taking the biochemistry core courses (Biochemistry 311 and 314) in their junior year are encouraged to complete at least Chemistry 101 (or 160) and 201 and Biological Sciences 145 (or 160) and 200 during the first year. The committee further recommends Biological Sciences 220 and Chemistry 325 to students planning graduate work in biochemistry. Finally, all majors are required to complete a comprehensive written examination, and all seniors must give an oral presentation on a biochemical topic in the Senior Symposium.

Requirements for the Major

Credits

- A minimum of 48 credits and at least 4 credits of calculus-based physics as pre-

requisite to Chemistry 308. (Students with advanced credits, see below.)

Courses

Required core curriculum:

- Chemistry 101 (or 160) and 201, General Chemistry I and II; 202 and 302, Organic Chemistry I and II; and 308, Chemical Thermodynamics
- Biological Sciences 145 (or 160) and 200, Introductory Biology I and II, and 210, Genetics and Molecular Biology
- Biochemistry 311, Protein Biochemistry and Cellular Metabolism and Biochemistry 314, Nucleic Acids Biochemistry and Molecular Biology
- 8 additional credits elected from 300-level courses in biochemistry, biology, and chemistry. This requirement is intended to increase the breadth and depth of your knowledge and application of biochemistry through related 300-level course work.

Students with Advanced Credits

A student coming to the College with advanced credits from IB or A-level course work or Advanced Placement examinations can skip up to four courses at the introductory level (Biological Sciences 145 (or 160), 200; Chemistry 101 (or 160), 201) in accordance with the number of advanced credits she has received. However, advanced placement courses cannot replace more than 8 credits of the major. A student considering skipping many of the introductory-level courses should consult with her advisor or program chair and be reminded that a pre-health curriculum requires a year of biology and a year of general chemistry taken at an American university or college.

Other

- Satisfactory completion of a comprehensive written examination

- An oral presentation on a biochemical topic must be given at the Senior Symposium.

Biochemistry is an interdisciplinary major. Students who pursue an interdisciplinary major automatically fulfill the College's "outside the major" requirement (see p. 8).

No minor in biochemistry is offered.

Course Offerings

111f Life's Matrix: Water, Water, Every Where ... Nor Any Drop to Drink

(First-year seminar; writing-intensive course) Water, the ideal solvent in which life-granting reactions occur, makes up 70 percent of the planet and our body. We will examine the remarkable chemical, physical properties of water that sustain life, and study its involvement in two critical biochemical processes: cellular respiration and photosynthesis. We are running out of this precious resource, due to population expansion, unsustained usage of water by industrialized societies, pollution of waterways, and the redistribution of water due to engineering, climate change, and commerce. Steven Solomon's book, *Water: The Epic Struggle for Wealth, Power and Civilization* (2010), will inform our discussions. *Meets Science and Math II-C requirement*
L. Hsu

4 credits

295fs Independent Study

Independent work in biochemistry can be conducted with any member of the biochemistry committee and, upon approval, also with other members of the biological sciences and chemistry departments.

Does not meet a distribution requirement
The department

Students conducting an independent lab research project for credit in a department, program, or lab covered by the College's chemical hygiene plan must participate in a safety training session before beginning research; credit will not be granted to students who do not receive safety training; 1-4 credits

311f Protein Biochemistry and Cellular Metabolism

(Same as Biological Sciences 311, Chemistry 311) This course is a rigorous introduction to the study of protein molecules and their role as catalysts in the cell. Topics include general principles of protein folding, protein structure-function correlation, enzyme kinetics and mechanism, carbohydrate and lipid biochemistry, and metabolic pathways (catabolic and anabolic) and their interaction and cross-regulation. Biological transformation of energy is considered in light of the principles of thermodynamics.

Meets Science and Math II-B requirement
L. Hsu

Prereq. Biological Sciences 210 (can be taken concurrently), Chemistry 302; 4 credits

314s Nucleic Acids Biochemistry and Molecular Biology

(Same as Biological Sciences 314, Chemistry 314) This course is an in-depth examination of DNA and RNA structures and how these structures support their respective functions during replication, transcription, and translation of the genetic material. Emphasis is on the detailed mechanisms associated with each step of gene expression. Discussions incorporate many recent advances brought about by recombinant DNA technology.

Meets Science and Math II-B requirement
L. Hsu

Prereq. Biological Sciences 210, Chemistry 302 (can be taken concurrently); 4 credits

330s Topics in Biochemistry and Molecular Biology

This course each year examines a number of important and exciting topics in biochemistry, molecular biology, and other related fields of biology. The intellectual and research development that formulated these fundamental concepts is traced through extensive readings of the primary literature. Discussions emphasize the critical evaluation of experimental techniques, data analysis, and interpretation. Substantial student participation in the form of oral presentation is expected.

Does not meet a distribution requirement
L. Hsu

Prereq. Biochemistry 311 or Biochemistry 314;

4 credits

395fs Independent Study

Independent work in biochemistry can be conducted with any member of the biochemistry committee and, upon approval, also with other members of the biological sciences and chemistry departments.

Does not meet a distribution requirement

The department

See safety training restrictions in the course description for Biochemistry 295; 1-8 credits