BIOCHEMISTRY

The College of Arts and Sciences awards the Bachelor of Arts and Bachelor of Science degrees in biochemistry. The required courses for the majors and minor are offered by the Department of Biochemistry in the School of Medicine.

Major

The two undergraduate major programs in Biochemistry, BA and BS, are based on the Arts and Sciences General Education Requirements, but differ in amount and intensity of the mathematics and physical sciences required. Either degree is excellent for students planning to undertake graduate work in biochemistry or in related areas of the biomedical sciences. Both the BA and the BS programs permit students to follow many options after graduation. Graduates are well prepared to pursue further studies in the biological sciences, for a career in medicine, for Doctor of Pharmacy programs, for employment in the chemical, pharmaceutical, and biotechnology industries, or as research assistants in research laboratories. The BA has a reduced emphasis on the quantitative aspects of science and makes available a considerable amount of elective time that permits a student to either concentrate on biochemistry even more intensively than the curriculum requires, or pursue other subjects in science or liberal arts. The BS degree is for the student who has a particularly strong interest in the quantitative physical sciences.

In both programs, undergraduate research is required. As many as nine hours of Research in Biochemistry (BIOC 391 Research Project) may be credited toward the requirements for graduation. At least six credits are highly recommended. The capstone in Biochemistry (BIOC 393 Senior Capstone Experience) is a thesis and presentation of a student's undergraduate research studies.

Bachelor of Arts in Biochemistry

Required Courses:

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<th>Course</th>
<th>Description</th>
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<th>Spring</th>
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<td>BIOC 307</td>
<td>Introduction to Biochemistry: From Molecules To Medical Science</td>
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<td>BIOC 308</td>
<td>Molecular Biology</td>
<td>4</td>
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<td>BIOC 373</td>
<td>Biochemistry SAGES Seminar (SAGES Departmental Seminar)</td>
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<td>BIOC 312</td>
<td>Proteins and Enzymes</td>
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<td>or BIOC 334</td>
<td>Structural Biology</td>
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<td>BIOL 215 &amp; 215L</td>
<td>Cells and Proteins and Cells and Proteins Laboratory</td>
<td>4</td>
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<td>CHEM 105</td>
<td>Principles of Chemistry I</td>
<td>3</td>
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<td>or CHEM 111</td>
<td>Principles of Chemistry for Engineers</td>
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<tr>
<td>CHEM 106</td>
<td>Principles of Chemistry II</td>
<td>3</td>
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<tr>
<td>or ENGR 145</td>
<td>Chemistry of Materials</td>
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<td>Principles of Chemistry Laboratory</td>
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<td>Physics and Frontiers I - Mechanics</td>
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Total Units | 66-68

BA Biochemistry, Sample Plan of Study

Freshman

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Sophomore

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Bachelor of Science in Biochemistry

Required Courses:

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<td>BIOC 308</td>
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<td>BIOC 312</td>
<td>Proteins and Enzymes</td>
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<td>Biochemistry SAGES Seminar</td>
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<td>BIOC 393</td>
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<td>PHYS 121 or 123</td>
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Note: At least the 3 credits of undergraduate research, BIOC 391 Research Project, is minimally recommended for the Capstone. An additional 3 credits of BIOC 391 is highly recommended. Students should consult their academic advisers about the elective parts of the curriculum.

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a Selected students may be invited to take CHEM 323 Organic Chemistry I or CHEM 324 Organic Chemistry II.

b Selected students may be invited to take PHYS 123 Physics and Frontiers I - Mechanics and PHYS 124 Physics and Frontiers II - Electricity and Magnetism in place of PHYS 121 General Physics I - Mechanics and PHYS 122 General Physics II - Electricity and Magnetism.

c BA students must take either BIOC 312 Proteins and Enzymes or BIOC 334 Structural Biology. For BA students who take both courses, one course will serve as a technical elective.
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<td>Physics and Frontiers II - Electricity and Magnetism</td>
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**BS Biochemistry, Sample Plan of Study**

### Freshman

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<td>Genes, Evolution and Ecology (BIOL 214)</td>
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<td>&amp; Genes, Evolution and Ecology Lab (BIOL 214L)</td>
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<td>Principles of Chemistry Laboratory (CHEM 113)</td>
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### Sophomore

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<td>SAGES University Seminar II</td>
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### Junior

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<td>Introduction to Biochemistry: From Molecules To Medical Science (BIOC 307)</td>
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<td>GER Course</td>
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<td>Basic Statistics for Engineering and Science Using R Programming (STAT 312R)</td>
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<td>or Statistics for Experimenters</td>
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<td>Molecular Biology (BIOC 308)</td>
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Total Units in Sequence: 123

- Note: At least the 3 credits of undergraduate research, BIOC 391 Research Project, is a prerequisite to the Capstone. An additional 3 credits of BIOC 391 is highly recommended. Students should consult their academic advisers about the elective parts of the curriculum.

- a Selected students may be invited to take CHEM 323 Organic Chemistry I or CHEM 324 Organic Chemistry II
- b Selected students may be invited to take PHYS 123 Physics and Frontiers I - Mechanics and PHYS 124 Physics and Frontiers II - Electricity and Magnetism in place of PHYS 121 General Physics I - Mechanics and PHYS 122 General Physics II - Electricity and Magnetism.

**Honors Program**

Biochemistry majors who have excellent academic records may be admitted to the department's Undergraduate Honors Program. To graduate with departmental honors in biochemistry, a student must satisfy the following requirements:

1. A combined grade point average of at least 3.600
2. A minimum of 6 credit hours of undergraduate research (BIOC 391) in one laboratory
3. A BIOC 393 capstone report approved by the Undergraduate Education Committee of the department on the basis of the quality
of the research, the written report, and an oral presentation. An acceptable report:

- Should follow a standard journal format
- Should demonstrate the student’s understanding of the research area, experimental techniques, goals and implications of the project
- Should show that the student has advanced his/her knowledge of the applicable techniques and the underlying scientific concepts.

4. Using all or part of the capstone report, the student must be a co-author on a manuscript either submitted, in press or published in a peer reviewed journal.

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## Minor

**Required Courses:**

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<td>BIOC 308</td>
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</table>

**Total Units** 14

Students may obtain credit for a minor in biochemistry by completing one year of freshman chemistry (including laboratory), one year of organic chemistry (including laboratory), two semesters of approved biology courses, and three semesters of didactic courses in biochemistry.