Biochemistry, B.S.

The Department of Biochemistry offers two bachelor's degrees—a B.S. and a B.A. To maximize student flexibility, the curriculum in the first two years is identical for both degrees.

Requirements

The Bachelor of Science with a major in biochemistry requires a minimum of 120 s.h., including 73 s.h. of work for the major. Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences General Education Program.

All students majoring in biochemistry are initially placed in the Bachelor of Arts degree program. Students in good academic standing can switch to the Bachelor of Science degree program after completing one semester of organic chemistry (CHEM:2230 Organic Chemistry I for Majors or CHEM:2210 Organic Chemistry I). Students who wish to change their degree program to the Bachelor of Science should do so by filling out a change of degree form at the College of Liberal Arts and Sciences Office of Academic Programs & Student Development.

The biochemistry major for the Bachelor of Science degree is intended primarily for students planning careers in research. The B.S. program prepares students to pursue graduate degrees, such as an M.S., Ph.D., or joint M.D./Ph.D., or to work as research technicians. The B.S. program requires 15 s.h. more credit in science and laboratory electives than the B.A. program does.

Qualified students in the Bachelor of Science degree program may graduate with honors in the biochemistry major; see "Honors in the Major" below.

The B.S. with a major in biochemistry requires the following course work.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Requirements</td>
<td>73</td>
</tr>
<tr>
<td>Additional Requirements</td>
<td>49</td>
</tr>
<tr>
<td>Total Hours</td>
<td>24</td>
</tr>
</tbody>
</table>

Common Requirements

Students complete the following during their first two years.

- BIOC:3120 Biochemistry and Molecular Biology I-II (6 s.h.)
- BIOC:3130 Experimental Biochemistry (2 s.h.)
- BIOL:1411 Foundations of Biology - Diversity of Form and Function (8 s.h.)
- BIOL:1412 Principles of Chemistry I-II (8 s.h.)
- CHEM:1110 & CHEM:1120 Organic Chemistry I (3 s.h.)
- CHEM:2210 Organic Chemistry I for Majors (3 s.h.)
- CHEM:2220 Organic Chemistry II (3 s.h.)
- CHEM:2220 Organic Chemistry II for Majors (3 s.h.)
- CHEM:2410 Organic Chemistry Laboratory (3 s.h.)
- CHEM:2420 Organic Chemistry Laboratory for Majors (3 s.h.)
- MATH:1850 & MATH:1860 Calculus I-II (8 s.h.)
- PHYS:1511 College Physics I (4 s.h.)

or

- PHYS:1611 Introductory Physics I (3 s.h.)
- PHYS:1512 College Physics II (3 s.h.)
- PHYS:1612 Introductory Physics II (3 s.h.)

If students take PHYS:1612 Introductory Physics II, they must take the course with the lab component.

Additional Requirements

In addition to the common requirements listed above, students must complete the following.

- This course: BIOC:4241 Biophysical Chemistry I (3 s.h.)
- Two of these: BIOC:4242 Biophysical Chemistry II (3 s.h.)
- CHEM:4430 Principles of Physical Chemistry (3 s.h.)
- CHEM:4431 Physical Chemistry I (3 s.h.)
- CHEM:4432 Physical Chemistry II (3 s.h.)

All of these:
- Advanced science electives approved by biochemistry advisor (9 s.h.)
- Advanced laboratory courses, including BIOC:4999 (6 s.h.)

Students are encouraged to begin research by taking BIOC:3993 Undergraduate Independent Study, which has no prerequisites. The course involves experience in an active biochemistry research lab, which must be arranged ahead of time with a supervising faculty member. Students may make arrangements directly with the faculty member, or they may request assistance from an undergraduate advisor. Credit earned in BIOC:3993 does not count toward the major, but it does count toward the minimum of 120 s.h. required to graduate.

In order to register for BIOC:4999 Research, Independent Study, students must have completed BIOC:3120 Biochemistry and Molecular Biology I, BIOC:3130 Biochemistry and Molecular Biology II, and BIOC:3140 Experimental Biochemistry. They must have a grade average of B or higher in the three courses and a grade of B-minus or higher in each course. They also must have completed BIOC:3150 Development of Senior Research Project and should have prior research experience (e.g., BIOC:3993 or HONR:3994 Honors Research Practicum) or consent of the instructor.

B.S. with Teacher Licensure

Students interested in earning licensure to teach in elementary and/or secondary schools must complete the College of Education's Teacher Education Program (TEP) in addition to the requirements for the major and all requirements for graduation. The TEP requires several College of Education courses and student teaching. Contact the Office of Student Services for details.

Students must satisfy all degree requirements and complete Teacher Education Program licensure before degree conferral.

Joint B.S./Ph.D. in Biomedical Science

The joint Bachelor of Science in biochemistry/Doctor of Philosophy program in biomedical science (biochemistry subprogram) permits students to transition into the Ph.D. program during their senior year and to count 12 s.h. of credit toward both the B.S. and Ph.D. requirements. The
joint program provides a research-intensive experience and shortens the training time for students interested in pursuing independent biochemistry research careers. Students in the program receive financial support during the second half of their senior year and throughout their Ph.D. study.

Students must be pursuing a Bachelor of Science with a major in biochemistry, and by the beginning of their senior year they must:

- have 108 s.h. of undergraduate credit;
- have a minimum grade-point average of 3.50;
- have completed four semesters of research experience (summer research counts as one semester); and
- have completed BIOC:3120 Biochemistry and Molecular Biology I, BIOC:3130 Biochemistry and Molecular Biology II, and BIOC:3140 Experimental Biochemistry.

Students interested in the joint program should speak with their academic advisor and the biochemistry honors advisor during their first year or at the beginning of their sophomore year. Separate application to each degree program is required. Applicants must be admitted to both programs before they may be admitted to the joint degree program. For more information, contact the Department of Biochemistry.

### Honors

#### Honors in the Major

Students have the opportunity to graduate with honors in the major. Departmental honors students must maintain a cumulative University of Iowa g.p.a. of at least 3.33. To graduate with honors in the biochemistry major, students must earn 6 s.h. in BIOC:4999 Research, Independent Study. They must present their research results in a report written in the form of a journal article and in an oral report given at a special open departmental seminar.

#### University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the University’s honors program.

Membership in the UI Honors Program is not required to earn honors in the biochemistry major.

### Academic Plans

#### Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the University’s Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.

**Before the third semester begins:** CHEM:1110 Principles of Chemistry I, CHEM:1120 Principles of Chemistry II, MATH:1850 Calculus I, and MATH:1860 Calculus II

**Before the fifth semester begins:** BIOL:1411 Foundations of Biology, BIOL:1412 Diversity of Form and Function, CHEM:2210 Organic Chemistry I or CHEN:2230 Organic Chemistry I for Majors, CHEM:2220 Organic Chemistry II or CHEM:2240 Organic Chemistry II for Majors, and CHEM:2410 Organic Chemistry Laboratory or CHEM:2420 Organic Chemistry Laboratory for Majors

**Before the seventh semester begins:** PHYS:1611 Introductory Physics I or PHYS:1511 College Physics I, PHYS:1612 Introductory Physics II or PHYS:1512 College Physics II, BIOC:3150 Development of Senior Research Project, one semester of BIOC:3993 Undergraduate Independent Study for students planning to take BIOC:4999 Research, Independent Study, BIOC:3120 Biochemistry and Molecular Biology I, BIOC:3130 Biochemistry and Molecular Biology II, BIOC:3140 Experimental Biochemistry, two science electives, and at least 90 s.h. earned toward the degree

**Before the eighth semester begins:** CHEM:4431 Physical Chemistry I or CHEM:4432 Physical Chemistry II or BIOC:4241 Biophysical Chemistry I or BIOC:4242 Biophysical Chemistry II, a science elective, and at least 3 s.h. of BIOC:4999 Research, Independent Study

**During the eighth semester:** enrollment in all remaining course work in the major, all remaining General Education courses, and a sufficient number of semester hours to graduate

### Sample Plan of Study

#### Biochemistry (B.S.)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM:1110</td>
<td>Principles of Chemistry I (also GE: Natural Sciences with a lab)</td>
<td>4</td>
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<tr>
<td>MATH:1850</td>
<td>Calculus I</td>
<td>4</td>
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<tr>
<td>RHET:1030</td>
<td>Rhetoric (GE: Rhetoric or other General Education course)</td>
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</tr>
<tr>
<td>Elective course</td>
<td></td>
<td>1</td>
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<tr>
<td>CSI:1600</td>
<td>Success at Iowa</td>
<td>2</td>
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<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
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<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II (major, also GE: Natural Sciences)</td>
<td>4</td>
</tr>
<tr>
<td>ENGL:1200</td>
<td>The Interpretation of Literature (GE: Interpretation of Literature)</td>
<td>3</td>
</tr>
<tr>
<td>MATH:1860</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
<td>GE: Diversity and Inclusion</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Elective course</td>
<td></td>
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**Hours** | 15

| **Second Year** | | |
| **Fall** | | |
| BIOL:1411 | Foundations of Biology | 4 |
| CHEM:2230 | Organic Chemistry I for Majors | 3 |
| GE: Historical Perspectives | | 3 |
| GE: World Languages or elective course | | 3-5 |
| Elective course | | 2 |

**Hours** | 15-17

<p>| <strong>Spring</strong> | | |
| BIOL:1412 | Diversity of Form and Function | 4 |
| CHEM:2240 | Organic Chemistry II for Majors | 3 |
| CHEM:2420 | Organic Chemistry Laboratory for Majors | 3 |
| Major: science elective (consult with advisor) | | 3 |</p>
<table>
<thead>
<tr>
<th>GE: World Languages or elective course</th>
<th>3-5</th>
<th>Hours</th>
<th>16-18</th>
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</thead>
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**Third Year**

**Fall**
- BIOC:3120  Biochemistry and Molecular Biology I  3
- BIOC:3993  Undergraduate Independent Study  3
- PHYS:1611  Introductory Physics I  4
- GE: Values and Culture  3
- GE: World Languages or elective course  3-5

**Spring**
- BIOC:3130  Biochemistry and Molecular Biology II  3
- BIOC:3140  Experimental Biochemistry  2
- BIOC:3150  Development of Senior Research Project  2
- PHYS:1612  Introductory Physics II  4
- GE: World Languages or elective course  3-5

<table>
<thead>
<tr>
<th>Elective course</th>
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</table>

**Fourth Year**

**Fall**
- BIOC:4999  Research, Independent Study  3
- BIOC:5241  Biophysical Chemistry I  3
- Major: science elective (consult with advisor)  3
- GE: International and Global Issues  3
- GE: Literary, Visual, and Performing Arts  3

<table>
<thead>
<tr>
<th>Hours</th>
<th>15</th>
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</table>

**Spring**
- BIOC:4999  Research, Independent Study  3
- BIOC:5242  Biophysical Chemistry II  3
- Major: science elective (consult with advisor)  3
- Major: science elective (consult with advisor)  3
- GE: Social Sciences  3

<table>
<thead>
<tr>
<th>Hours</th>
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</table>

<table>
<thead>
<tr>
<th>Total Hours</th>
<th>122-130</th>
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1. Enrollment in chemistry and math courses require completion of placement exams.
2. General Education (GE) courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses. For more information, view the General Education Program.
3. Students may use their elective courses to complete a double major, minors, or certificates.
4. Students who have completed four years of a single language in high school have satisfied the College of Liberal Arts and Sciences GE: World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.

**Career Advancement**

Biochemistry graduates with bachelor’s degrees often work as research assistants in industry, government, education, or health services; teach in secondary schools; or go on to advanced study in medicine, dentistry, or other areas. The program offers solid preparation for careers in medicine, biology, chemistry, dentistry, research, or related sciences. About one-third of biochemistry majors go on to study medicine; others enter graduate programs or professional degree programs.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.