Biochemistry, B.S.

To maximize student flexibility, the curriculum for the B.S. with a major in biochemistry is identical to the B.A. degree in the first two years of study.

**Requirements**

The Bachelor of Science with a major in biochemistry requires a minimum of 120 s.h., including 70 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 GE CLAS Core.

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 Undergraduate Programs office.

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 a combined M.D./Ph.D. program, or to work as research technicians. The B.S. program requires 12-14 s.h. more credit in science and laboratory electives than the B.A. program does.

Qualified students may graduate with honors in the biochemistry major; see “Honors in the Major” under Honors [p. 2] in this section of the Catalog.

The Bachelor of Science with a major in biochemistry requires the following coursework.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Common Requirements</td>
<td>49</td>
</tr>
<tr>
<td>21</td>
<td>Additional Requirements</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

**Common Requirements**

Students complete the following during their first three years.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMB:3120 &amp; BMB:3130</td>
<td>Biochemistry and Molecular Biology I-II</td>
<td>6</td>
</tr>
<tr>
<td>BMB:3140</td>
<td>Experimental Biochemistry</td>
<td>2</td>
</tr>
<tr>
<td>BIOL:1411-1412</td>
<td>Foundations of Biology - Diversity of Form and Function</td>
<td>8</td>
</tr>
<tr>
<td>CHEM:1110 &amp; CHEM:1120</td>
<td>Principles of Chemistry I-II</td>
<td>8</td>
</tr>
<tr>
<td>CHEM:2210 or CHEM:2230</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:2220 or CHEM:2240</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:2410</td>
<td>Organic Chemistry Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:2420</td>
<td>Organic Chemistry Laboratory for Majors</td>
<td>3</td>
</tr>
<tr>
<td>MATH:1850 &amp; MATH:1860</td>
<td>Calculus I-II</td>
<td>8</td>
</tr>
<tr>
<td>PHYS:1511 or PHYS:1611</td>
<td>College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS:1512 or PHYS:1612</td>
<td>College Physics II</td>
<td>4</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMB:4240</td>
<td>Biophysics and Advanced Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>And one of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM:4430</td>
<td>Principles of Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:4431</td>
<td>Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:4432</td>
<td>Physical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>One of these options:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMB:4999</td>
<td>Advanced Undergraduate Biochemistry Research</td>
<td>6</td>
</tr>
<tr>
<td>Advanced laboratory courses</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>And:</td>
<td>Advanced science electives, approved by biochemistry and molecular biology advisor</td>
<td>9</td>
</tr>
</tbody>
</table>

Students are encouraged to begin research by taking BMB:3993 Undergraduate Biochemistry Research, 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 BMB:3993 does not count toward the major, but it does count toward the minimum of 120 s.h. required to graduate.

Before students register for BMB:4999 Advanced Undergraduate Biochemistry Research, they must have completed BMB:3120 Biochemistry and Molecular Biology I, BMB:3130 Biochemistry and Molecular Biology II, BMB:3140 Experimental Biochemistry, and BMB:3150 Development of Senior Research Project, with a grade of B-minus or higher in each course. Students also are required to have prior research experience, such as in BMB:3993 Undergraduate Biochemistry Research, URES:3994 Undergraduate Research and Creative Projects, or HONR:3994 Honors Research Practicum, and permission of the instructor. Students can only count 6 s.h. in BMB:4999 toward their requirements for the degree.

**Teacher Licensure**

Students interested in teaching in elementary and/or secondary schools should seek admission to the Teacher Education Program (TEP) in the College of Education.

To qualify for licensure in secondary teaching, students in the TEP complete a degree in education as well as a related College of Liberal Arts and Sciences degree. See Apply on the College of Education website for details on requirements and
deadlines for applying to the College of Education and about TEP choices of majors leading to licensure.

Combined Programs

**B.S./Ph.D. in Biochemistry**

The combined Bachelor of Science/Doctor of Philosophy in biochemistry program 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 combined 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 g.p.a. of 3.50;
- have completed four semesters of research experience (summer research counts as one semester); and
- have completed BMB:3120 Biochemistry and Molecular Biology I, BMB:3130 Biochemistry and Molecular Biology II, and BMB:3140 Experimental Biochemistry.

Students interested in the combined program should speak with their academic advisor and the biochemistry and molecular biology 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 combined degree program. For more information, contact the Department of Biochemistry and Molecular Biology.

**Honors**

**Honors in the Major**

Students have the opportunity to graduate with honors in the major. They must maintain a cumulative University of Iowa g.p.a. of at least 3.33 and a g.p.a. of at least 3.33 in work for the major. They must earn 6 s.h. in BMB:4999 Advanced Undergraduate Biochemistry Research and present their research results in a honors thesis 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.

**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.

**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 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, BMB:3150 Development of Senior Research Project, one semester of BMB:3993 Undergraduate Biochemistry Research for students planning to take BMB:4999 Advanced Undergraduate Biochemistry Research, BMB:3120 Biochemistry and Molecular Biology I, BMB:3130 Biochemistry and Molecular Biology II, BMB:3140 Experimental Biochemistry, two science electives, and at least 90 s.h. earned toward the degree.

**Before the eighth semester begins:** BMB:4240 Biophysics and Advanced Biochemistry or CHEM:4430 Principles of Physical Chemistry or CHEM:4431 Physical Chemistry I or CHEM:4432 Physical Chemistry II, a science elective, and at least 3 s.h. of BMB:4999 Advanced Undergraduate Biochemistry Research.

**During the eighth semester:** enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

**Sample Plan of Study**

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

**Biochemistry, B.S.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Any Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students in good academic standing can switch from the B.A. to the B.S. degree program after completing one semester of organic chemistry (CHEM:2210 Organic Chemistry I or CHEM:2230 Organic Chemistry I for Majors).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### First Year
**Fall**
- **CHEM:1110** Principles of Chemistry I \(^b\), \(^c\) 4
- **MATH:1850** Calculus I \(^c\), \(^d\) 4
- **RHET:1030** Rhetoric or The Interpretation of Literature 3 - 4
- **ENGL:1200** Success at Iowa 2
- Elective course \(^e\) 1

**Hours** 14-15

**Spring**
- **CHEM:1120** Principles of Chemistry II \(^c\) 4
- **ENGL:1200** or **RHET:1030** The Interpretation of Literature or Rhetoric 3 - 4
- **MATH:1860** Calculus II 4
- **GE CLAS Core: Diversity and Inclusion** \(^f\) 3
- Elective course \(^e\) 1

**Hours** 15-16

### Second Year
**Fall**
- **Biol:1411** Foundations of Biology \(^c\) 4
- **CHEM:2210** or **CHEM:2230** Organic Chemistry I or Organic Chemistry I for Majors 3
- **GE CLAS Core: Historical Perspectives** \(^f\) 3
- **GE CLAS Core: World Languages First Level** Proficiency or elective course \(^g\) 4 - 5
- Elective course \(^e\) 2

**Hours** 16-17

**Spring**
- **Biol:1412** Diversity of Form and Function \(^c\) 4
- **CHEM:2220** or **CHEM:2240** Organic Chemistry II or Organic Chemistry II for Majors 3
- **CHEM:2420** or **CHEM:2410** Organic Chemistry Laboratory for Majors or Organic Chemistry Laboratory 3
- **GE CLAS Core: World Languages Second Level** Proficiency or elective course \(^g\) 4 - 5

**Hours** 17-18

### Third Year
**Fall**
- **BMB:3120** Biochemistry and Molecular Biology I 3
- **BMB:3993** Undergraduate Biochemistry Research 3
- **PHYS:1511** or **PHYS:1611** College Physics I \(^c\) or Introductory Physics I 4
- **GE CLAS Core: Values and Culture** \(^f\) 3
- **GE CLAS Core: World Languages Second Level** Proficiency or elective course \(^g\) 4 - 5

**Hours** 17-18

**Spring**
- **BMB:3130** Biochemistry and Molecular Biology II 3
- **PHYS:1512** or **PHYS:1612** College Physics II \(^c\) or Introductory Physics II 4
- **GE CLAS Core: World Languages Fourth Level** Proficiency or elective course \(^g\) 4 - 5
- Elective course \(^e\) 1

**Hours** 16-17

### Fourth Year
**Fall**
- **BMB:4999** Advanced Undergraduate Biochemistry Research 3
- **CHEM:4431** Physical Chemistry I \(^j\) 3
- **CHEM:4432** or **CHEM:4430** or **BMB:4240** or **BMB:4240** Chemistry or Biophysics and Advanced Biochemistry 3
- **GE CLAS Core: International and Global Issues** \(^f\) 3
- **GE CLAS Core: Literary, Visual, and Performing Arts** \(^f\) 3

**Hours** 15

**Spring**
- **BMB:4999** Advanced Undergraduate Biochemistry Research 3
- **CHEM:4431** Physical Chemistry I \(^j\) 3
- **CHEM:4432** or **CHEM:4430** or **BMB:4240** or **BMB:4240** Chemistry or Biophysics and Advanced Biochemistry 3
- **GE CLAS Core: Social Sciences** \(^f\) 3

**Degree Application:** apply on MyUI before deadline (typically in February for spring, September for fall)

**Total Hours** 125-131

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\(a\) Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative and Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Culture.

\(b\) Enrollment in chemistry courses requires completion of a placement exam.

\(c\) Fulfills a major requirement and may fulfill a GE requirement.

\(d\) Enrollment in math courses requires completion of a placement exam.

\(e\) Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

\(f\) GE CLAS Core 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.

\(g\) Students who have completed four years of a single language in high school have satisfied the GE CLAS Core World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.

\(h\) Students are required to complete 9 s.h. in advanced science electives approved by biochemistry advisor.
i Students must complete BMB:4240 and one course from CHEM:4430, CHEM:4431, CHEM:4432.

j Please see Academic Calendar, Office of the Registrar website for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Graduation Services.