# Bachelor of Science in Biochemistry

The Bachelor of Science degree in Biochemistry is recommended for those students interested in integrating the subjects of biology and chemistry. The cross-disciplinary nature of the degree provides students with a good foundation for careers in research and development in the private sector and in academia. Many will continue their education in graduate schools or in health related fields such as medicine, dentistry, or pharmacy.

For further information, please see the Chemical Sciences (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-chemistry/#text) overview page.

## COURSE | TITLE | S.H.
---|---|---
**FIRST YEAR REQUIREMENT - STUDENT SUCCESS**
YSU 1500 | Success Seminar | 1-2
or SS 1500 | Strong Start Success Seminar | 1-2
or HONR 1500 | Intro to Honors | 1-2

### General Education Requirements

- **ENGL 1550** | Writing 1 | 3-4
- **ENGL 1551** | Writing 2 | 3
- **CMST 1545** | Communication Foundations | 3
- Mathematics requirement (met with MATH in major)
- Some courses are categorized in more than one Knowledge Domain.
- Courses can only be used once within the GE model.
- **Arts and Humanities (6 s.h.)**

### Natural Sciences (2 courses, 1 with lab)

- Social Science (6 s.h.)
- Social and Personal Awareness (6 s.h.)

### The following CHEM core courses are required:

- **CHEM 1515**
  - General Chemistry 1 & 1515L
  - General Chemistry 1 Laboratory & 1515L
- **CHEM 1515R**
  - Recitation for General Chemistry 1
- **CHEM 1516**
  - General Chemistry 2 & 1516L
  - General Chemistry 2 Laboratory & 1516L
- **CHEM 1516R**
  - Recitation for General Chemistry 2
- **CHEM 2604**
  - Quantitative Analysis & 2604L
  - Quantitative Analysis Laboratory & 2604L
- **CHEM 3719**
  - Organic Chemistry 1 & 3719L
  - Organic Chemistry 1 Laboratory & 3719L
- **CHEM 3719R**
  - Organic Chemistry Recitation 1
- **CHEM 3720**
  - Organic Chemistry 2 & 3720L
  - Organic Chemistry 2 Laboratory & 3720L
- **CHEM 3720R**
  - Organic Chemistry Recitation 2
- **CHEM 3739**
  - Physical Chemistry 1 & 3739L
  - Physical Chemistry 1 Laboratory & 3739L
- **CHEM 3785**
  - Biochemistry 1
- **CHEM 3785L**
  - Biochemistry Laboratory
- **CHEM 3786**
  - Biochemistry 2
- **CHEM 4850**
  - Chemistry Research
- **CHEM 4850L**
  - Chemistry Research Laboratory
- **CHEM 5876**
  - Enzyme Analysis

Select 10 s.h. in upper-level CHEM electives from the list below. At least one elective must be a laboratory course or include a laboratory component:

- **CHEM 3729**
  - Inorganic Chemistry
- **CHEM 3764**
  - Chemical Toxicology
- **CHEM 4850L**
  - Chemistry Research Laboratory
- **CHEM 4891**
  - Special Topics
- **CHEM 5804 & 5804L**
  - Chemical Instrumentation and Chemical Instrumentation Laboratory
- **CHEM 5821**
  - Intermediate Organic Chemistry
- **CHEM 5822 & 5822L**
  - Advanced Organic Laboratory and Advanced Organic Laboratory
- **CHEM 5832 & 5832L**
  - Solid State Structural Methods and Solid State Structural Methods Laboratory

The following BIOL core courses are required (14 s.h.):

- **BIOL 2601**
  - General Biology: Molecules and Cells
- **BIOL 2601L**
  - General Biology: Molecules and Cells Laboratory
- **BIOL 3702**
  - Microbiology
- **BIOL 3702L**
  - Microbiology Laboratory
- **BIOL 3711**
  - Cell Biology: Fine Structure
- **BIOL 3721**
  - Genetics

At least 3 s.h. in upper-level BIOL courses required from the list below; 5 s.h. recommended if needed to attain 120 s.h. required for graduation.

- **BIOL 4800**
  - Bioinformatics
- **BIOL 4800L**
  - Bioinformatics Laboratory
- **BIOL 4801**
  - Environmental Microbiology
- **BIOL 4801L**
  - Environmental Microbiology Laboratory
- **BIOL 4829**
  - Microbial Physiology
- **BIOL 4836**
  - Cell Biology: Molecular Mechanisms
- **BIOL 4836L**
  - Cell Biology: Molecular Mechanisms Laboratory
- **BIOL 4890**
  - Molecular Genetics
- **BIOL 4890L**
  - Molecular Genetics Laboratory
- **BIOL 5840**
  - Advanced Microbiology

The following support courses are required (22 s.h.):

- **MATH 1571**
  - Calculus 1
- **MATH 1572**
  - Calculus 2
- **STAT 3717**
  - Statistical Methods
- **or STAT 3743**
  - Probability and Statistics
- **PHYS 2610**
  - General Physics 1
- **PHYS 2610L**
  - General Physics 1 Laboratory
- **PHYS 2611**
  - General Physics 2
- **PHYS 2611L**
  - General Physics laboratory 2

**Total Semester Hours**: 120-122

### Year 1

#### Fall

- **YSU 1500**
  - Success Seminar | S.H. 1
- **CHEM 1515 & 1515L**
  - General Chemistry 1 and General Chemistry 1 Laboratory | 1
- **CHEM 1515R**
  - Recitation for General Chemistry 1 | 1
- **CHEM 1516 & 1516L**
  - General Chemistry 2 and General Chemistry 2 Laboratory | 1
- **CHEM 1516R**
  - Recitation for General Chemistry 2 | 1
- **CHEM 2604 & 2604L**
  - Quantitative Analysis and Quantitative Analysis Laboratory | 1
- **CHEM 3719 & 3719L**
  - Organic Chemistry 1 and Organic Chemistry 1 Laboratory | 1
- **CHEM 3719R**
  - Organic Chemistry Recitation 1 | 1
- **CHEM 3720 & 3720L**
  - Organic Chemistry 2 and Organic Chemistry 2 Laboratory | 1
- **CHEM 3720R**
  - Organic Chemistry Recitation 2 | 1
- **CHEM 3739 & 3739L**
  - Physical Chemistry 1 and Physical Chemistry 1 Laboratory | 1
- **CHEM 3785**
  - Biochemistry 1 | 1
- **CHEM 3785L**
  - Biochemistry Laboratory | 1
- **CHEM 3786**
  - Biochemistry 2 | 1
- **CHEM 4850**
  - Chemistry Research | 1
- **CHEM 4850L**
  - Chemistry Research Laboratory | 2
- **CHEM 5876**
  - Enzyme Analysis | 2

Select 10 s.h. in upper-level CHEM electives from the list below. At least one elective must be a laboratory course or include a laboratory component:

- **BIOL 2601 & 2601L**
  - General Biology: Molecules and Cells and General Biology: Molecules and Cells Laboratory | 1

**Semester Hours**: 13-14

#### Spring

- **CHEM 1516 & 1516L**
  - General Chemistry 2 and General Chemistry 2 Laboratory | 1
- **CHEM 1516R**
  - Recitation for General Chemistry 2 | 1
- **MATH 1571**
  - Calculus 1 | 1
- **ENGL 1550 or ENGL 1549**
  - Writing 1 or Writing 1 with Support | 3-4

**Semester Hours**: 13-14
**Bachelor of Science in Biochemistry**

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<th>Course Code</th>
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<th>Semester Hours</th>
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**Year 2**

**Fall**

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<td>Organic Chemistry Recitation 1</td>
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<td>CHEM 2604 &amp; 2604L</td>
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<td>PHYS 2610</td>
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**Year 3**

**Fall**

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<td>CHEM 3785L</td>
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**Year 4**

**Fall**

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**Spring**

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**Total Semester Hours**

120-121

**Learning Outcomes**

The undergraduate student learning outcomes for the major in biochemistry are as follows:

- Undergraduate students will demonstrate an understanding of the fundamentals of chemistry and biochemistry.
- Undergraduate students will demonstrate independent and critical thinking.
- Undergraduate students will demonstrate an understanding of the fundamentals of modern chemical instrumentation.
- Undergraduate students will be able to interpret experimental data.
- Undergraduate students will effectively communicate their ideas both orally and in writing.