

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.yzu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/departments-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 | |
| or HONR 1500 | Intro to Honors | |
| General Education Requirements | | |
| ENGL 1550 | Writing 1 | 3-4 |
| or ENGL 1549 | Writing 1 with Support | |
| 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.) | | 6 |
| Natural Sciences (2 courses, 1 with lab) | | |
| This requirement is met through courses in the major | | |
| Social Science (6 s.h.) | | 6 |
| Social and Personal Awareness (6 s.h.) | | 6 |
| The following CHEM core courses are required: | | |
| CHEM 1515 | General Chemistry 1 | 3 |
| CHEM 1515L | General Chemistry 1 Laboratory | 1 |
| CHEM 1515R | Recitation for General Chemistry 1 | 1 |
| CHEM 1516 | General Chemistry 2 | 3 |
| CHEM 1516L | General Chemistry 2 Laboratory | 1 |
| CHEM 1516R | Recitation for General Chemistry 2 | 1 |
| CHEM 2604 & 2604L | Quantitative Analysis and Quantitative Analysis Laboratory | 5 |
| CHEM 3719 | Organic Chemistry 1 | 3 |
| CHEM 3719L | Organic Chemistry 1 Laboratory | 1 |
| CHEM 3719R | Organic Chemistry Recitation 1 | 1 |
| CHEM 3720 | Organic Chemistry 2 | 3 |
| CHEM 3720L | Organic Chemistry 2 Laboratory | 1 |
| CHEM 3720R | Organic Chemistry Recitation 2 | 1 |
| CHEM 3739 | Physical Chemistry 1 | 3 |
| CHEM 3739L | Physical Chemistry 1 Laboratory | 1 |
| CHEM 3785 | Biochemistry 1 | 3 |
| CHEM 3785L | Biochemistry Laboratory | 1 |
| CHEM 3786 | Biochemistry 2 | 3 |
| CHEM 4850 | Chemistry Research | 1 |
| CHEM 4851 | Chemistry Research Project | 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: 10

| | |
|-------------------|--|
| CHEM 3729 | Inorganic Chemistry |
| CHEM 3764 | Chemical Toxicology |
| CHEM 4851 | Chemistry Research Project |
| 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 1: Molecules and Cells | 3 |
| BIOL 2601L | General Biology I: Molecules and Cells Laboratory | 1 |
| BIOL 3702 & 3702L | Microbiology and Microbiology Laboratory | 4 |
| BIOL 3711 | Cell Biology: Fine Structure | 3 |
| BIOL 3721 | Genetics | 3 |

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. 5

| | |
|-------------------|--|
| BIOL 4800 & 4800L | Bioinformatics and Bioinformatics Laboratory |
| BIOL 4801 & 4801L | Environmental Microbiology and Environmental Microbiology Laboratory |
| BIOL 4829 | Microbial Physiology |
| 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 | 4 |
| MATH 1572 | Calculus 2 | 4 |
| STAT 3717 | Statistical Methods | 4 |
| or STAT 3743 | Probability and Statistics | |
| PHYS 2610 | General Physics 1 | 4 |
| PHYS 2610L | General Physics Laboratory 1 | 1 |
| PHYS 2611 | General Physics 2 | 4 |
| PHYS 2611L | General Physics laboratory 2 | 1 |

Total Semester Hours 120-122

Year 1

| Fall | | S.H. |
|--------------|------------------------------------|------|
| YSU 1500 | Success Seminar | 1-2 |
| or SS 1500 | or Strong Start Success Seminar | |
| or HONR 1500 | or Intro to Honors | |
| CHEM 1515 | General Chemistry 1 | 3 |
| CHEM 1515L | General Chemistry 1 Laboratory | 1 |
| CHEM 1515R | Recitation for General Chemistry 1 | 1 |
| MATH 1571 | Calculus 1 | 4 |
| ENGL 1550 | Writing 1 | 3-4 |
| or ENGL 1549 | or Writing 1 with Support | |

Semester Hours 13-15

Spring

| | | |
|------------|------------------------------------|---|
| CHEM 1516 | General Chemistry 2 | 3 |
| CHEM 1516L | General Chemistry 2 Laboratory | 1 |
| CHEM 1516R | Recitation for General Chemistry 2 | 1 |
| MATH 1572 | Calculus 2 | 4 |

| | | |
|-----------------------------|--|----------------|
| ENGL 1551 | Writing 2 | 3 |
| BIOL 2601 | General Biology 1: Molecules and Cells | 3 |
| BIOL 2601L | General Biology I: Molecules and Cells Laboratory | 1 |
| Semester Hours | | 16 |
| Year 2 | | |
| Fall | | |
| CHEM 3719 | Organic Chemistry 1 | 3 |
| CHEM 3719L | Organic Chemistry 1 Laboratory | 1 |
| CHEM 3719R | Organic Chemistry Recitation 1 | 1 |
| CHEM 2604 & 2604L | Quantitative Analysis and Quantitative Analysis Laboratory | 5 |
| PHYS 2610 | General Physics 1 | 4 |
| PHYS 2610L | General Physics Laboratory 1 | 1 |
| Semester Hours | | 15 |
| Spring | | |
| CHEM 3720 | Organic Chemistry 2 | 3 |
| CHEM 3720L | Organic Chemistry 2 Laboratory | 1 |
| CHEM 3720R | Organic Chemistry Recitation 2 | 1 |
| PHYS 2611 | General Physics 2 | 4 |
| PHYS 2611L | General Physics laboratory 2 | 1 |
| STAT 3717 or STAT 3743 | Statistical Methods or Probability and Statistics | 4 |
| Semester Hours | | 14 |
| Year 3 | | |
| Fall | | |
| CHEM 3785 | Biochemistry 1 | 3 |
| CHEM 3785L | Biochemistry Laboratory | 1 |
| CHEM 3739 | Physical Chemistry 1 | 3 |
| CHEM 3739L | Physical Chemistry 1 Laboratory | 1 |
| BIOL 3721 | Genetics | 3 |
| GER | | 6 |
| Semester Hours | | 17 |
| Spring | | |
| CHEM 3786 | Biochemistry 2 | 3 |
| CHEM 5876 | Enzyme Analysis | 2 |
| BIOL 3711 | Cell Biology: Fine Structure | 3 |
| BIOL 3702 & 3702L | Microbiology and Microbiology Laboratory | 4 |
| GER | | 3 |
| Semester Hours | | 15 |
| Year 4 | | |
| Fall | | |
| CHEM 4850 | Chemistry Research | 1 |
| CHEM Upper-Level Elective | | 6 |
| CHEM 4851 | Chemistry Research Project | 2 |
| CMST 1545 | Communication Foundations | 3 |
| GER | | 3 |
| Semester Hours | | 15 |
| Spring | | |
| CHEM Upper-Level Elective | | 4 |
| BIOL Upper-Level Elective | | 5 |
| GER | | 6 |
| Semester Hours | | 15 |
| Total Semester Hours | | 120-122 |

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.