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 Department of Chemistry Overview Page (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-chemistry/#text).

The Bachelor of Science degree in Biochemistry is recommended for those students interested in integrating the subjects of biology and chemistry.

The following BIOI 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 BIOI courses required from the list below; 4 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 4837 Cell Biology: Protein Biology Laboratory
- BIOL 4890 Molecular Genetics
- BIOL 4890L Molecular Genetics Laboratory
- BIOL 5840 Advanced Microbiology

Total Semester Hours 120

Year 1

Fall

- CHEM 1515 General Chemistry 1
- CHEM 1515L General Chemistry 1 Laboratory
- CHEM 1515R Recitation for General Chemistry 1

Spring

- CHEM 1516 General Chemistry 2
- CHEM 1516L General Chemistry 2 Laboratory
- CHEM 1516R Recitation for General Chemistry 2

Select 10 s.h. in upper-level CHEM electives from list below. At least 4 s.h. must include an upper-level laboratory:

- CHEM 3729 Inorganic Chemistry
- CHEM 3764 Chemical Toxicology
- CHEM 4850L Chemistry Research Laboratory
- CHEM 4891 Special Topics

- CHEM 5804 Chemical Instrumentation
- CHEM 5804L Chemical Instrumentation Laboratory
- CHEM 5821 Intermediate Organic Chemistry
- CHEM 5822 Advanced Organic Laboratory
- CHEM 5822L Advanced Organic Laboratory
- CHEM 5832 Solid State Structural Methods
- CHEM 5832L Solid State Structural Methods Laboratory

Other requirements include:

- Social and Personal Awareness 6
- Social Science 6
- Arts and Humanities 6
- Natural Sciences (2 courses, one must include a lab) - NS requirement included in the major.
- Writing 1
- Writing 2
- Calculus 1
- Calculus 1 Laboratory
- Calculus 2
- Calculus 2 Laboratory
- Probability and Statistics
- General Physics 1
- General Physics 1 Laboratory
- General Physics 2
- General Physics 2 Laboratory
- General Physics laboratory 1
- General Physics laboratory 2
- General Physics laboratory 2 Laboratory
- Recitation for General Chemistry 1
- Recitation for General Chemistry 1 Laboratory
- Recitation for General Chemistry 2
- Recitation for General Chemistry 2 Laboratory
- General Biology: Molecules and Cells
- General Biology: Molecules and Cells Laboratory
- Physical Chemistry 1
- Physical Chemistry 1 Laboratory
- Physical Chemistry 2
- Physical Chemistry 2 Laboratory
- Physical Chemistry laboratory 1
- Physical Chemistry laboratory 2
- Physical Chemistry laboratory 2 Laboratory
- Organic Chemistry 1
- Organic Chemistry 1 Laboratory
- Organic Chemistry Recitation 1
- Organic Chemistry Recitation 2
- Enzyme Analysis
- Advanced Organic Laboratory
- Advanced Organic Laboratory Laboratory
- Recitation for General Chemistry 1 Laboratory
- Recitation for General Chemistry 2 Laboratory
- Calculus 2
- Calculus 2 Laboratory
- General Biology: Molecules and Cells
- General Biology: Molecules and Cells Laboratory
- Writing 2

Course Title S.H.

- ENGL 1550 Writing 1 3
- ENGL 1551 Writing 2 3
- CMST 1545 Communication Foundations 3
- STEM 1520 STEM First Year Orientation 2
- CHEM 1515 General Chemistry 1 4
- CHEM 1515L General Chemistry 1 Laboratory 4
- CHEM 1515R Recitation for General Chemistry 1 1
- CHEM 1516 General Chemistry 2 4
- CHEM 1516L General Chemistry 2 Laboratory 4
- CHEM 1516R Recitation for General Chemistry 2 1
- CHEM 2604 Quantitative Analysis & 2604L Quantitative Analysis Laboratory 5
- CHEM 3719 Organic Chemistry 1 & 3719L Organic Chemistry 1 Laboratory 4
- CHEM 3719R Organic Chemistry Recitation 1 1
- CHEM 3720 Organic Chemistry 2 & 3720L Organic Chemistry 2 Laboratory 4
- CHEM 3720R Organic Chemistry Recitation 2 1
- CHEM 3739 Physical Chemistry 1 & 3739L Physical Chemistry 1 Laboratory 4
- CHEM 3785 Biochemistry 1 3
- CHEM 3785L Biochemistry Laboratory 1
- CHEM 3786 Biochemistry 2 3
- CHEM 4850 Chemistry Research 1
- CHEM 4850L Chemistry Research Laboratory 2
- CHEM 5876 Enzyme Analysis 2
- CHEM 5804 Chemical Instrumentation & 5804L Chemical Instrumentation Laboratory
- CHEM 5821 Intermediate Organic Chemistry
- CHEM 5822 Advanced Organic Laboratory & 5822L Advanced Organic Laboratory
- BIOL 2601 General Biology: Molecules and Cells & 2601L General Biology: Molecules and Cells Laboratory
- BIOL 3702 Microbiology & 3702L Microbiology Laboratory
- BIOL 3711 Cell Biology: Fine Structure 3
- BIOL 3721 Genetics 3
- BIOL 4800 Bioinformatics & 4800L Bioinformatics Laboratory
- BIOL 4801 Environmental Microbiology & 4801L Environmental Microbiology Laboratory
- BIOL 4829 Microbial Physiology
- BIOL 4836 Cell Biology: Molecular Mechanisms & 4836L Cell Biology: Molecular Mechanisms Laboratory
- BIOL 4837 Cell Biology: Protein Biology Laboratory
- BIOL 4890 Molecular Genetics
- BIOL 4890L Molecular Genetics Laboratory
- BIOL 5840 Advanced Microbiology
- 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
- STEM 1520 STEM First Year Orientation 2
- STEM First Year Orientation 14
### Year 2

#### Fall

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### Year 4

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#### Spring

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### Total Semester Hours

**120**

### Learning Outcomes

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

- Students will demonstrate independent and critical thinking.
- Students will understand the fundamentals of modern chemical instrumentation.