BIOCHEMISTRY AND BIOPHYSICS UNDERGRADUATE MAJOR (BS, HBS)

This major offers the following option(s):

- Advanced Biophysics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/advanced-biophysics-option/)
- Neuroscience (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/neuroscience-option/)
- Pre-Medicine/Biochemistry and Biophysics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/pre-medicinebiochemistry-biophysics-option/)

Administered by the Department of Biochemistry and Biophysics under the School of Life Sciences.

Accredited by the American Society for Biochemistry and Molecular Biology (https://www.asbmb.org/Accreditation/Schools/).

The BS degree in Biochemistry and Biophysics provides a degree path centered on the chemistry and physics of life processes with training that integrates the principles of chemistry, physics, mathematics, statistics, biochemistry, cell and molecular biology, and biological sequence analysis. Biochemists explore the chemical structure of living matter and the chemical reactions occurring in living cells. Biophysicists use the methods of physical science to study the structure and functions of macromolecules. Biochemistry and Biophysics majors receive excellent training for careers in medicine and related health professions, biotechnology and pharmaceutical industries, or for graduate study in biochemistry and biophysics. Training in biophysics is especially valuable for students who are interested in drug design. Majors must select an option either in Advanced Biophysics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/advanced-biophysics-option/), Neuroscience (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/neuroscience-option/), or Pre-Medicine/Biochemistry and Biophysics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/pre-medicinebiochemistry-biophysics-option/). The first two options are designed for students interested in careers in the biotechnology and pharmaceutical industries or graduate work in biochemistry and biophysics, with the second especially well-suited for students interested in neuroscience. The third option is ideal for students interested in careers in medicine and related health professions.

Major Code: 506

- Demonstrate a core knowledge base in the theory and practice of modern Biochemistry and Biophysics.
- Function successfully in the laboratory and use safe laboratory practices.
- Critically evaluate data and design experiments to test hypotheses relevant to the practice of Biochemistry and Biophysics.
- Read and evaluate primary literature in the discipline.
- Effectively communicate scientific data and ideas, using various formats appropriate for different target audiences.
- Use databases, computational tools and other online resources effectively.
- Demonstrate awareness of ethical issues in the practice of science.

Students majoring in Biochemistry and Biophysics cannot seek a double major in Biochemistry and Molecular Biology, Biology, Biohealth Sciences, Botany, Microbiology or Zoology.

The major sections and courses within them are arranged in the order they are generally completed. Students are required to declare one of three options in Advanced Biophysics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/advanced-biophysics-option/), Neuroscience (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/neuroscience-option/), or Pre-Medicine/Biochemistry and Biophysics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/biochemistry-biophysics/biochemistry-biophysics-bs-hbs/pre-medicinebiochemistry-biophysics-option/). For further information, see MyDegrees or the Department of Biochemistry and Biophysics website (https://biochem.science.oregonstate.edu/).

Code	Title	Credits
Students in the Biochemistry and Biophysics major must complete the following biology courses with a C- or better to continue on to upper division Biology (BI), Zoology (Z), and Biochemistry-Biophysics (BB) coursework:		
BI 221 & BI 222 & BI 223	*PRINCIPLES OF BIOLOGY: CELLS and *PRINCIPLES OF BIOLOGY: ORGANISMS and *PRINCIPLES OF BIOLOGY: POPULATIONS	12
Students must also complete the following chemistry courses with a C- or better to continue on to upper division Chemistry (CH) and Biochemistry-Biophysics (BB) coursework:		
CH 231 & CH 261	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 231	5
or CH 231H & CH 261H	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 231	
CH 232 & CH 262	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 232	5
or CH 232H & CH 262H	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 232	
CH 233 & CH 263	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 233	5
or CH 233H & CH 263H	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 233	
CH 334	ORGANIC CHEMISTRY	3
CH 335	ORGANIC CHEMISTRY	3
CH 336	ORGANIC CHEMISTRY	3
Students must also complete the following biochemistry and biophysics courses with a C- or better to continue on to upper division Biochemistry-Biophysics (BB) coursework:		
BB 314	CELL AND MOLECULAR BIOLOGY	4
or BB 314H	CELL AND MOLECULAR BIOLOGY	
Students must also complete the following mathematics courses with a C- or better to continue on to upper division Mathematics (MTH) coursework:		
MTH 251	*DIFFERENTIAL CALCULUS	4
or MTH 251H	*DIFFERENTIAL CALCULUS	
MTH 252	INTEGRAL CALCULUS	4
or MTH 252H	INTEGRAL CALCULUS	

Code	Title	Credits
Biochemistry and Biophysics Core		
BB 111	INTRODUCTION TO BIOCHEMISTRY AND BIOPHYSICS RESEARCH	1
BB 211	PROFESSIONAL DEVELOPMENT II: MOLECULAR, MICROBIAL, BIOHEALTH (not required but strongly recommended)	1
Biological Sciences		
BI 221 & BI 222 & BI 223	*PRINCIPLES OF BIOLOGY: CELLS and *PRINCIPLES OF BIOLOGY: ORGANISMS and *PRINCIPLES OF BIOLOGY: POPULATIONS +	12
Mathematics and Statistics		
MTH 251	*DIFFERENTIAL CALCULUS +	4
MTH 252	INTEGRAL CALCULUS +	4
MTH 254	VECTOR CALCULUS I	4
ST 351	INTRODUCTION TO STATISTICAL METHODS	4
Chemistry		
CH 231 & CH 261	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 231 +	5
CH 232 & CH 262	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 232 +	5
CH 233 & CH 263	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 233 +	5
CH 334 & CH 335 & CH 336	ORGANIC CHEMISTRY and ORGANIC CHEMISTRY and ORGANIC CHEMISTRY	9
CH 361 & CH 362	EXPERIMENTAL CHEMISTRY I and EXPERIMENTAL CHEMISTRY I +	6
CH 440	PHYSICAL CHEMISTRY	3
Physical Sciences		
PH 211 & PH 212 & PH 213	*GENERAL PHYSICS WITH CALCULUS and *GENERAL PHYSICS WITH CALCULUS and *GENERAL PHYSICS WITH CALCULUS	12
Biochemistry and Biophysics		
BB 317	^SCIENTIFIC THEORY AND PRACTICE	3
BB 314	CELL AND MOLECULAR BIOLOGY +	4
BB 345	INTRODUCTION TO BIOLOGICAL SEQUENCE ANALYSIS	2
BB 490	BIOCHEMISTRY 1: STRUCTURE AND FUNCTION	3
BB 491	BIOCHEMISTRY 2: METABOLISM	3
BB 492	BIOCHEMISTRY 3: GENETIC BIOCHEMISTRY	3
BB 481	MACROMOLECULAR STRUCTURE	3
BB 482	BIOPHYSICS	3
BB 483	ADVANCED BIOCHEMISTRY AND BIOPHYSICS: CAPSTONE	3
BB 493	BIOCHEMISTRY LABORATORY MOLECULAR TECHNIQUES 1	3
BB 494	BIOCHEMISTRY LABORATORY MOLECULAR TECHNIQUES 2	3
BB 498	ASBMB CERTIFICATION EXAM	0
Option		
Students must complete one of three options in Advanced Biophysics, Neuroscience, or Pre-medicine/Biochemistry and Biophysics		minimum 21
Total credits required for graduation is 180		
Total Credits		108

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Baccalaureate Core Course (BCC)

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Writing Intensive Course (WIC)

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Honors versions of these course are available

Major Code: 506

First Year

Fall		**Credits**
BB 111	INTRODUCTION TO BIOCHEMISTRY AND BIOPHYSICS RESEARCH	1
CH 231	GENERAL CHEMISTRY	4
CH 261	*LABORATORY FOR CHEMISTRY 231	1
MTH 251	*DIFFERENTIAL CALCULUS	4
COMM 111 or COMM 114 or COMM 218	*PUBLIC SPEAKING or *ARGUMENT AND CRITICAL DISCOURSE or *INTERPERSONAL COMMUNICATION	3
Bacc Core or Elective		3
	Credits	16
Winter		
CH 232	GENERAL CHEMISTRY	4
CH 262	*LABORATORY FOR CHEMISTRY 232	1
MTH 252	INTEGRAL CALCULUS	4
WR 121	*ENGLISH COMPOSITION	3
Bacc Core or Elective		3
	Credits	15
Spring		
CH 233	GENERAL CHEMISTRY	4
CH 263	*LABORATORY FOR CHEMISTRY 233	1
HHS 231	*LIFETIME FITNESS FOR HEALTH	2
PAC XXX	PHYSICAL ACTIVITY CLASS	1
MTH 254	VECTOR CALCULUS I	4
Bacc Core or Elective		3
	Credits	15
Second Year		
Fall		
BI 221	*PRINCIPLES OF BIOLOGY: CELLS	4
CH 334	ORGANIC CHEMISTRY	3
PH 211	*GENERAL PHYSICS WITH CALCULUS	4
Bacc Core or Elective		3
	Credits	14
Winter		
BI 222	*PRINCIPLES OF BIOLOGY: ORGANISMS	4
CH 335	ORGANIC CHEMISTRY	3
PH 212	*GENERAL PHYSICS WITH CALCULUS	4
Option Course		3
	Credits	14
Spring		
BI 223	*PRINCIPLES OF BIOLOGY: POPULATIONS	4
CH 336	ORGANIC CHEMISTRY	3
PH 213	*GENERAL PHYSICS WITH CALCULUS	4
Bacc Core		3
Option Course		3
	Credits	17
Third Year		
Fall		
BB 345	INTRODUCTION TO BIOLOGICAL SEQUENCE ANALYSIS	2
BB 490	BIOCHEMISTRY 1: STRUCTURE AND FUNCTION	3
CH 361	EXPERIMENTAL CHEMISTRY I [1]	3
CH 440	PHYSICAL CHEMISTRY	3
Option Course		4
	Credits	15
Winter		
BB 317	^SCIENTIFIC THEORY AND PRACTICE	3
BB 491	BIOCHEMISTRY 2: METABOLISM	3
CH 362	EXPERIMENTAL CHEMISTRY I [1]	3
Bacc Core or Elective		3
Option Course		4
	Credits	16

Spring		
BB 314	CELL AND MOLECULAR BIOLOGY	4
BB 492	BIOCHEMISTRY 3: GENETIC BIOCHEMISTRY	3
ST 351	INTRODUCTION TO STATISTICAL METHODS	4
Option Course		3
	Credits	14
Fourth Year		
Fall		
BB 481	MACROMOLECULAR STRUCTURE	3
BB 493	BIOCHEMISTRY LABORATORY MOLECULAR TECHNIQUES 1	3
Option Course		4
Bacc Core or Elective		6
	Credits	16
Winter		
BB 482	BIOPHYSICS	3
BB 494	BIOCHEMISTRY LABORATORY MOLECULAR TECHNIQUES 2	3
BB 498	ASBMB CERTIFICATION EXAM	0
Electives		8
	Credits	14
Spring		
BB 483	ADVANCED BIOCHEMISTRY AND BIOPHYSICS: CAPSTONE	3
Bacc Core or Electives		12
	Credits	15
	Total Credits	181

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Baccalaureate Core Course (BCC)

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Writing Intensive Course (WIC)