Biochemistry, B.S.

Degree Offered

- Bachelor of Science

Nature of the Program

The biochemistry curriculum prepares students for careers requiring a strong background in fundamental principles of both the physical and life sciences. The program is a collaborative effort between the Department of Biology and the C. Eugene Bennett Department of Chemistry in the Eberly College of Arts and Sciences, and the School of Agriculture and Food Systems in the Davis College of Agriculture and Natural Resources.

The curriculum provides foundational knowledge in biochemistry, molecular biology, and chemistry. The variety of elective courses allows students to adapt the biochemistry major towards their specific interests, with applications in neuroscience, physiology, nutrition, microbiology, and pharmaceutical sciences. The capstone and experiential learning courses provide students with hands-on opportunities to develop scientific skills in the lab or with community partners. Students may choose electives that lead to certification by either the American Society of Biochemistry and Molecular Biology or the American Chemical Society.

Students completing the degree in biochemistry are prepared for professional employment in a variety of fields, including agricultural and environmental sciences, chemical and pharmaceutical industries, biotechnology and biomedical industries, government and policy agencies, and the health professions. The biochemistry curriculum also provides students with the courses necessary for continued education in areas such as human or veterinary medicine, dentistry, optometry, pharmacy and pharmacology, agricultural science, biochemistry, molecular biology, genetics, neuroscience, chemistry, food science, nutrition, and toxicology.

Minors

All students have the possibility of earning one or more minors; list of all available minors and their requirements (http://catalog.wvu.edu/undergraduate/minors/). Please note that students may not earn a minor in their major field.

Admissions for 2026-2027

- First Time Freshmen are admitted directly to the major. For the timely completion of the degree, it is recommended that students have a minimum MATH ACT of 22, a MATH SAT of 540, or an ALEKS score of 45.
- Students transferring from another WVU major or from another institution with fewer than 24 credits and at least a 2.0 overall GPA are admitted directly to the major. For the timely completion of the degree, it is recommended that students have a minimum MATH ACT of 20, a MATH SAT of 520, or an ALEKS score of 40.
- Students transferring from another WVU major or from another institution with 24 hours or more must have at least a 2.0 overall GPA and meet the following requirements prior to being admitted to the major:completed CHEM 115, CHEM 115L, BIOL 115, and BIOL 115L with a C- or better in each. Students are encouraged to speak with a Biochemistry advisor to assess timely progression through the program.

Major Code: 1201

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. **(**http://registrar.wvu.edu/gef/**)**

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101	Introduction to Composition and Rhetoric	
& ENGL 102	and Composition, Rhetoric, and Research	
or ENGL 103	Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3

F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)	9
Total Hours	31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

- **Writing Requirement;** Biochemistry Bachelor of Science students fulfill the Writing and Communication Skills requirement by completing ENGL 101 and ENGL 102 (or ENGL 103), and at least two additional **SpeakWrite Certified Courses™** from: BIOL 115, BIOL 117, BIOL 219, and CHEM 402.

Curriculum Requirements

Code	Title	Hours
University Requirements		36
Biochemistry Program Requirements		47
Biochemistry Major Requirements		37
Total Hours		120

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 4, 5, 6, and 7		18
ANRD 191	First-Year Seminar	1
General Electives		17
Total Hours		36

Biochemistry Program Requirements

Code	Title	Hours
STEM Foundations		
BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory	4
BIOL 117 & 117L	Introductory Physiology and Introductory Physiology Laboratory	4
BIOL 219 & 219L	Cellular and Molecular Biology and Cellular & Molecular Biology Laboratory	4
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	4
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory	4
CHEM 215 & 215L	Introductory Analytical Chemistry and Introductory Analytical Chemistry Laboratory	4
CHEM 233 & 233L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	4
CHEM 234 & 234L	Organic Chemistry 2 and Organic Chemistry 2 Laboratory	4
PHYS 101 & 101L	Introductory Physics 1 and Introductory Physics 1 Laboratory	4
PHYS 102 & 102L	Introductory Physics 2 and Introductory Physics 2 Laboratory	4
MATH 155	Calculus 1	4
STAT 211	Elementary Statistical Inference	3
Total Hours		47

Biochemistry Major Requirements

Code	Title	Hours
Biochemistry Requirements		
AGBI 199	Orientation to Biochemistry	1
CHEM 362 & 362L	Biochemistry 1 and Biochemistry 1 Laboratory	4
AGBI 420 & 420L	Principles of Biochemistry 2 and Principles of Biochemistry 2 Laboratory	4
BIOL 423	Biochemistry of Nucleic Acids and Proteins	3
CHEM 341 & 341L	Physical Chemistry: Brief Course and Physical Chemistry: Brief Course Laboratory	4
Advanced Biochemistry Electives		
CHEM 312	Environmental Chemistry *	3
or CHEM 322	Inorganic Chemistry 1	
or CHEM 336	Fundamental Concepts in Early Drug Discovery	
BIOL 310	Advanced Cellular/Molecular Biology	3
or BIOL 316	Developmental Biology	
or BIOL 324	Molecular Genetics	
or BIOL 335	Cell Physiology	
or BIOL 420	Genomics	
BIOL 410	Cell and Molecular Biology Methods	3
or CHEM 310	Instrumental Analysis	
or CHEM 335	Methods of Structure Determination	
AEM 341 & 341L	General Microbiology and General Microbiology Laboratory	3
or ANPH 400	Growth and Lactation Physiology	
or ANPH 424 & 424L	Physiology of Reproduction and Reproductive Laboratory	
or FDST 450	Food Chemistry	
or GEN 371 & 371L	Principles of Genetics and Principles of Genetics Laboratory	
or GEN 440	Genetic Engineering Technologies	
or GEN 450	Applied Developmental Genetics	
or HN&F 460	Advanced Nutrition	
or PLSC 460	Plant Biochemistry	
AEM 445	Food Microbiology	3
or ANPH 301	Introduction to Animal Physiology	
or BIOL 312	Introduction to Virology	
or BIOL 313	Molecular Basis of Cellular Growth	
or BIOL 344 & 344L	Advanced Human Physiology and Advanced Human Physiology Laboratory	
or BIOL 348	Neuroscience 1	
or BIOL 350	Plant Physiology	
or BIOL 409	Biochemical Basis of Therapeutics	
or BIOL 418	Medical Genetics	
or BIOL 426	Molecular Biology of Cancer	
or BIOL 436	Comparative Animal Physiology	
or BIOL 454	Immunology	
or HN&F 348	Science of Food Preparation	
or HN&F 473	Medical Nutrition Therapy 1	
or PPTH 401	General Plant Pathology	
or VETS 405	Parasitology	
or VETS 302	Animal Pathology	

AGBI 386	Undergraduate Research Experience 1	3
or AGBI 491	Professional Field Experience	
or BIOL 386	Undergraduate Research	
or CHEM 497	Research	
Capstone		
AGBI 403	Applied Biochemistry Literature	3
or CHEM 402	Chemistry Capstone: Chemical Literature	
Total Hours		37

*

Students interested in receiving accreditation from the American Chemical Society should choose CHEM 322 from the Advanced Chemistry Elective choices.

SUGGESTED PLAN OF STUDY

First Year

Fall	Hours	Spring	Hours
ANRD 191	1	AGBI 199	1
ENGL 101 (GEF 1)	3	ENGL 102 (GEF1)	3
BIOL 115 & 115L (GEF 2)	4	BIOL 117 & 117L (GEF 8)	4
CHEM 110	3	CHEM 115 & 115L	4
MATH 126	3	MATH 128	3
General Elective	1		
	15		15

Second Year

Fall	Hours	Spring	Hours
BIOL 219 & 219L	4	STAT 211	3
CHEM 116 & 116L	4	CHEM 233 & 233L	4
MATH 155	4	PHYS 101 & 101L	4
GEF 4	3	GEF 5	3
		General Elective	1
	15		15

Third Year

Fall	Hours	Spring	Hours
CHEM 234 & 234L	4	CHEM 362 & 362L	4
CHEM 215 & 215L	4	CHEM 341 & 341L	4
BIOL 423	3	Biochemistry Elective 1	3
PHYS 102 & 102L	4	GEF 6	3
		General Elective	1
	15		15

Fourth Year

Fall	Hours	Spring	Hours
AGBI 420 & 420L	4	Biochemistry Elective 5	3
Biochemistry Elective 2	3	Biochemistry Elective 6	3
Biochemistry Elective 3	3	Capstone	3
Biochemistry Elective 4	3	General Elective	3

GEF 7	3 General Elective	2
	16	14

Total credit hours: 120

Degree Progress

- By the end of the second semester in the major (excluding summer), students must have, at minimum, completed MATH 126 with a minimum grade of C-.
- By the end of their third semester in the major students are expected to have completed BIOL 115 & BIOL 115L, BIOL 117 & 117L, CHEM 115, 115L with a minimum grade of C- in each course and an overall GPA of 2.0.
- Students must maintain a GPA of at least 2.0 in the major and overall.
- All majors must attend an advising session with their Biochemistry advisor each semester.

Students who do not meet those benchmarks may be removed from the major.

Major Learning Outcomes

BIOCHEMISTRY

Students graduating with a degree in Biochemistry will be able to:

1. Demonstrate working knowledge of the ways in which chemical principles inform and constrain biological processes, including:

    a. the implications of chemical structures and related chemical properties on biological processes

    b. the pathways and regulation involved in the metabolism of biomolecules

    c. the ways that organic and inorganic molecules can be used to modify and manipulate cellular mechanisms

    d. the mechanisms that organisms use to respond to changing conditions over short and long timescales

    e. ethical issues related to biochemical experimentation, analysis, and communication

2. Analyze molecules and pathways relevant to biological systems and evaluate quantitative and statistical data

3. Apply biochemical knowledge and skills to answer questions and solve problems in agriculture, health, and the environment

4. Communicate in written and oral formats

5. Work in collaborative teams

6. Recognize safety hazards, assess risks, and use methods to prevent and respond to incidents