BIOTECHNOLOGY MAJOR, BACHELOR OF SCIENCE (BS)

Bachelor of Science in Biotechnology — a cutting-edge program designed to meet the growing demand for skilled biotech professionals in the Greater Spokane area and beyond. The degree was carefully crafted using direct input from leading local biotech industry partners. This ensures that EWU graduates are equipped with the knowledge and skills needed to thrive in fields ranging from contract manufacturing and diagnostics to research, and development.

The core coursework prepares every student with the required knowledge and skills to be successful in a variety of settings. The 20 elective credits allow students to tailor their education to their career goals with electives available in biology, chemistry, mathematics, physics, engineering, computer science, business, and technical communications.

This program prepares the next generation of biotech talent for both immediate workforce entry and advanced graduate study in academic (MS, Ph.D.) or professional (MLS, MD, DDS, etc.) programs.

Required Courses		
BIOL 171 & 171L	BIOLOGY I and BIOLOGY I LAB	5
BIOL 172 & 172L	BIOLOGY II and BIOLOGY II LAB	5
BIOL 173 & 173L	BIOLOGY III and BIOLOGY III LAB	5
BIOL 270 & 270L	BIOLOGICAL INVESTIGATION and BIOLOGICAL INVESTIGATION LAB	3
BIOL 301 & 301L	MICROBIOLOGY and MICROBIOLOGY LAB	5
BIOL 310	FUNDAMENTALS OF GENETICS	5
BIOL 340	BIOETHICS	2
BIOL 380	DATA ANALYSIS FOR BIOLOGISTS	5
or MATH 380	ELEMENTARY PROBABILITY AND STATISTICS	
BIOL 383	BIOTECH INDUSTRY CURRENT GOOD MANUFACTURING PRACTICES	2
BIOL 384	BIOTECH INDUSTRY REGULATORY AFFAIRS	3
BIOL 385	MOLECULAR BIOTECHNIQUES	3
BIOL 438	MOLECULAR BIOLOGY	5
or CHEM 480	BIOCHEMISTRY	
BIOL 484	TOPICS IN MOLECULAR BIOTECHNOLOGY	2
BIOL 485	MOLECULAR BIOTECHNOLOGY	5
BIOL 488	MOLECULAR BIOTECHNOLOGY LABORATORY	2
CHEM 171 & 171L	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY I	5
CHEM 172 & 172L	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II	5
CHEM 173 & 173L	GENERAL CHEMISTRY III and GENERAL CHEMISTRY LABORATORY III	5
CHEM 304 & 304L	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	6
CHEM 351	ORGANIC CHEMISTRY I	4
CHEM 352	ORGANIC CHEMISTRY II	4
CHEM 372	ORGANIC CHEMISTRY LABORATORY I	3
PHYS 131 & PHYS 161	INTRODUCTORY PHYSICS I and MECHANICS LABORATORY	5
PHYS 132 & PHYS 162	INTRODUCTORY PHYSICS II and HEAT AND OPTICS LABORATORY	5
Electives		**20**
Up to 5 credits of BIOL 399, BIOL 495, and/or BIOL 499		
BIOL 302 & 302L	BOTANY and BOTANY LAB	

BIOL 304 & 304L	VERTEBRATE ZOOLOGY and VERTEBRATE ZOOLOGY LAB	
BIOL 409 & 409L	MYCOLOGY and MYCOLOGY LAB	
BIOL 421 & 421L	MEDICAL BACTERIOLOGY and MEDICAL BACTERIOLOGY LAB	
BIOL 430	IMMUNOLOGY	
BIOL 432	VIROLOGY	
BIOL 435	BIOLOGY OF CANCER	
BIOL 436	CELL BIOLOGY	
BIOL 460 & 460L	HEMATOLOGY and HEMATOLOGY LAB	
BIOL 468	SKELETAL BIOLOGY	
BIOL 473 & 473L	NEUROBIOLOGY and NEUROBIOLOGY LAB	
BUED 425	WORKPLACE COMMUNICATIONS USING COMPUTER APPLICATIONS	
or CMST 430	COMMUNICATION IN ORGANIZATIONS	
CHEM 420 & 420L	INSTRUMENTAL ANALYSIS and INSTRUMENTAL ANALYSIS LAB	
CSCD 110	INTRODUCTION TO PROGRAMMING	
MATH 161	CALCULUS I	
PHYS 133 & PHYS 163	INTRODUCTORY PHYSICS III and ELECTRONICS LABORATORY I	
TCOM 404	INSTRUCTIONS AND PROCEDURES	
Required Senior Capstone		
BIOL 490A & 490AL	BIOTECHNOLOGY CAPSTONE and BIOTECHNOLOGY CAPSTONE LAB	5
Total Credits		**124**

Plan of Study

The following plan of study is for a student with zero credits. Individual students may have different factors such as: credit through transfer work, Advanced Placement, Running Start, or any other type of college-level coursework that requires an individual plan.

Courses could be offered in different terms, checking the academic schedule is paramount in keeping an individual plan current. **Students should connect with an advisor to ensure they are on track to graduate.**

All Undergraduate students are required to meet the Undergraduate Degree Requirements (http://catalog.ewu.edu/undergraduate-degree/).

First Year					
Fall Quarter	**Credits**	**Winter Quarter**	**Credits**	**Spring Quarter**	**Credits**
ENGL 101	5	ENGL 201	5	CHEM 100 & 100L	5
MATH 107	5	MATH 114	5	MATH 141	5
Humanities & Arts BACR 1	5	Social Science BACR 1	5	Global Studies - graduation requirement	5
	15		**15**		**15**
Second Year					
Fall Quarter	**Credits**	**Winter Quarter**	**Credits**	**Spring Quarter**	**Credits**
BIOL 171 & 171L	5	BIOL 172 & 172L	5	BIOL 173 & 173L	5
CHEM 171 & 171L	5	CHEM 172 & 172L	5	BIOL 270 & 270L	3
Diversity - graduation requirement	5	Humanities & Arts BACR 2	5	BIOL 340	2
				CHEM 173 & 173L	5
	15		**15**		**15**
Third Year					
Fall Quarter	**Credits**	**Winter Quarter**	**Credits**	**Spring Quarter**	**Credits**
BIOL 310	5	BIOL 301 & 301L	5	BIOL 438 or CHEM 480	5

CHEM 304 & 304L	6	CHEM 352	4	BIOL 380 or MATH 380	5
CHEM 351	4	Social Science BACR 2[1]	5	CHEM 372	3
				Biotechnology Elective[2]	5
	15		**14**		**18**

Fourth Year

Fall Quarter	**Credits**	**Winter Quarter**	**Credits**	**Spring Quarter**	**Credits**
BIOL 383	2	BIOL 485	5	BIOL 384	3
BIOL 385	3	BIOL 488	2	BIOL 490A & 490AL	5
BIOL 484	2	PHYS 132 & PHYS 162	5	PHYS 133 & PHYS 163 (Biotechnology Elective)[2]	5
PHYS 131 & PHYS 161	5	Biotechnology Elective[2]	5		
Biotechnology Elective[2]	5				
	17		**17**		**13**

Total Credits 184

1 University Graduation Requirements (UGR) and Breadth Area Course Requirements (BACR) courses may be less than 5 credits and additional credits may be required to reach the required 180 total credits needed to graduate. Students should connect with an advisor to ensure they are on track to graduate.

2 Electives—choose 20 credits from the approved list. Up to 5 credits of BIOL 399, BIOL 495, and/or BIOL 499.

University Competencies and Proficiencies

English (http://catalog.ewu.edu/undergraduate-degree/#newitemtext)
Quantitative and Symbolic Reasoning (http://catalog.ewu.edu/undergraduate-degree/#mathcompproficienciestext)
Placement and Clearance (http://catalog.ewu.edu/placement/)
Prior Learning/Sources of Credit AP, CLEP, IB (http://catalog.ewu.edu/prior-learning/)

General Education Requirements (http://catalog.ewu.edu/undergraduate-degree/#generaleducationrequirementstext) (GER)

- Minimum Credits—180 cumulative credit hours
  - 60 upper-division credits (300 level or above)
  - 45 credits in residence (attendance) at Eastern, with at least 15 upper-division credits in major in residence at Eastern
- Minimum Cumulative GPA ≥2.0

Breadth Area Core Requirements (BACR)

Humanities and Arts (http://catalog.ewu.edu/undergraduate-degree/#humanitiesandfineartsgecrtext)
Natural Sciences (http://catalog.ewu.edu/undergraduate-degree/#naturalsciencesgecrtext)
Social Sciences (http://catalog.ewu.edu/undergraduate-degree/#socialsciencesgecrtext)

University Graduation Requirements (http://catalog.ewu.edu/undergraduate-degree/#universitygraduationrequirementstext) (UGR)

Diversity Course List (http://catalog.ewu.edu/undergraduate-degree/#cultureandgenderdiversityintheuslisttext)
World Language (http://catalog.ewu.edu/undergraduate-degree/#worldlanguagetext) (for Bachelor of Arts)
Global Studies Course List (http://catalog.ewu.edu/undergraduate-degree/#internationalstudiesrequirementtext)
Minor or Certificate (http://catalog.ewu.edu/undergraduate-degree/#majorminororcertificateugrtext)
Senior Capstone Course List (http://catalog.ewu.edu/undergraduate-degree/#capstonecourselisttext)

Application for Graduation (use EagleNET (https://inside.ewu.edu/eaglenet/)) must be made at least two terms in advance of the term expected to graduate (undergraduate and post-baccalaureate).

Use the Catalog Archives (http://catalog.ewu.edu/archives/) to determine *two important catalog years*.

1. The catalog *in effect at the student's first term* of current matriculation is used to determine **BACR** (Breadth Area Core Requirements) **and UGR** (Undergraduate Graduation Requirements).
2. The catalog *in effect at the time the student declares a major or minor* is used to determine the program requirements.

Students who earn a BS in Biotechnology from EWU should be able to:

- demonstrate a comprehensive understanding of the principles of molecular biology, genetics, chemistry, physics, and cell biology as they relate to biotechnology applications;
- develop proficiency in modern laboratory techniques, including DNA/RNA manipulation, PCR, electrophoresis, cell culture, protein analysis, microscopy, etc. while adhering to safety and ethical standards in biotechnology research;
- develop proficiency with procedures valued by biotech industry employers;
- apply quantitative, statistical, and computational tools to analyze experimental data and interpret results in the context of biotechnology and life sciences;
- use critical thinking and problem-solving skills to design experiments, troubleshoot protocols, and interpret the outcomes of biotechnological applications;
- explore and propose innovative uses of biotechnology in fields such as medicine, agriculture, environmental science, and industrial processes, addressing real-world problems with biotechnological solutions;
- identify and analyze ethical issues related to biotechnology, including regulatory frameworks, intellectual property rights, environmental impact, and public health implications, and act responsibly in professional settings;
- communicate scientific concepts, research findings, and biotechnology-related issues effectively through written reports, oral presentations, and visual media to diverse audiences, including scientists and the general public;
- work effectively in multidisciplinary teams, demonstrating leadership, collaboration, and interpersonal skills essential for successful biotech industry careers;
- understand the regulatory processes, quality control measures, and industrial practices in the biotechnology sector, including FDA regulations, GMP, and product development cycles;
- analyze the broader impact of biotechnology on global challenges such as health, food security, sustainability, and biodiversity, demonstrating awareness of how biotechnology can contribute to solving these issues.