# Biology

The Biology department is in the College of Science. To find the most up-to-date information, including Program Learning Outcomes for degree programs offered by the Biology department, visit their website.

### **Biology department**

## DEPARTMENT CHAIR

GAZDIK STOFER, Michaela Associate Professor

### FACULTY

**BEUCHER, Margaret** Lecturer BROOKS. Lauren Assistant Professor BYBEE, Paul Professor CUSICK, Jessica Assistant Professor DOMYAN, Eric Assistant Professor DUNN, Paul H. Associate Professor EGAN, Ashley Associate Professor FAIRBANKS, Daniel Professor FLOOD, Sara Associate Professor GAZDIK STOFER, Michaela Associate Professor HJELMEN, Carl Assistant Professor HOUGH, Colleen Associate Professor KARAFIATH, Summer Assistant Professor KOPP, Olga R. Professor KUDDUS, Ruhul H. Professor LANEY, Alma Glenn Assistant Professor **MUGLESTON, Joseph** Lecturer OGDEN, T. Heath Associate Professor **OTALORA-LUNA, Fernando** Lecturer PRICE, James V. Professor ROTTER, Michael Assistant Professor STEVENS, Michael T. Professor TAUZIN, Sebastien Associate Professor TAYLOR, Danielle Assistant Professor TAYLOR, Devin Assistant Professor THOMPSON, Zoe Assistant Professor TONGA, Lavon Lecturer WHALEY, Wayne Professor WILSON-ASHWORTH. Heather A. Professor WYATT, Brittney Assistant Professor ZAHN, Geoffrey Assistant Professor

# **Degrees & Programs**

# Biology, A.A.

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## Requirements

Students interested in biology, or related fields, are encouraged to earn at least a baccalaureate degree (BS). Many professions (e.g., Pharmacy or Medicine) require additional post-baccalaureate education. The AS/ AA degree is intended for students who plan to use it as a first step toward a baccalaureate degree. The AS/AA degree may be granted

to those who do not continue in a bachelor's program and meet the minimum requirements.

## **Total Program Credits: 60**

Gen	eral Education	Requirements:	39 Credits
	ENGL 1010	Introduction to Academic Writing CC	3
or	ENGH 1005	Literacies and Composition Across Contexts CC (5.0)	
	ENGL 2010	Intermediate Academic Writing CC	3
	MATH 1050	College Algebra QL	4
or	MATH 1055	College Algebra with Preliminaries QL (5.0)	
Corr	plete one of th	ne following:	3
	HIST 2700	US History to 1877 AS (3.0)	
and	HIST 2710	US History since 1877 AS (3.0)	
	HIST 1700	American Civilization AS (3.0)	
	HIST 1740	US Economic History AS (3.0)	
	POLS 1000	American Heritage SS (3.0)	
	POLS 1100	American National Government AS (3.0	)
Com	plete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
or	PHIL 205G	Ethics and Values IH GI (3.0)	
	HLTH 1100	Personal Health and Wellness TE (2.0)	
or	EXSC 1097	Fitness for Life TE	2
Dist	ribution Course	es:	
	BIOL 1610	College Biology I BB (To be taken with BIOL 1615)	4
	CHEM 1210	Principles of Chemistry I PP (To be taken with CHEM 1215)	4
	CHEM 1220	Principles of Chemistry II PP (To be taken with CHEM 1225)	4
	Humanities D	Distribution	3
	Fine Arts Dist	tribution	3
	Social/Behav	ioral Science	3
Disc	ipline Core Re	equirements:	13 Credits
Com	plete the follo	wing:	
	BIOL 1615	College Biology I Laboratory (To be taken with BIOL 1610)	1
	BIOL 1620	College Biology II	3
and	BIOL 1625	College Biology II Laboratory	1
	CHEM 1215	Principles of Chemistry I Laboratory (To be taken with CHEM 1210)	1
	CHEM 1225	Principles of Chemistry II Laboratory (To be taken with CHEM 1220)	1
	Minimum of 2 BOT, BTEC,	2 additional biology courses (BIOL, MICR, or ZOOL prefixes). <sup>1</sup>	6
Elec	tive Requirem	ents:	8 Credits
	Same Foreig	n Language.	8

Graduation Requirements:

- 1. Completion of a minimum of 60 semester credits.
- Overall grade point average of 2.0 (C) or above. (Departments may require a higher GPA.)
- Residency hours -- minimum of 20 credit hours through course attendance at UVU.
- 4. Completion of GE and specified departmental requirements.
- 5. For the AA degree, completion of 8 credit hours of course work from one language.

## Footnote

<sup>1</sup> BIOL 1010 cannot be used to meet this requirement. See Biology Advisor

### Biology, A.A. Careers

- 1. Demonstrate knowledge of cellular biology.
- 2. Demonstrate a knowledge of molecular genetics and principles of inheritance.

# **Related Careers**

- Natural Sciences Managers
- Biological Scientists, All Other
- · Life Scientists, All Other
- Biological Science Teachers, Postsecondary
- Secondary School Teachers, Except Special and Career/Technical Education

# Biology, A.S.

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## Requirements

Students interested in biology, or related fields, are encouraged to earn at least a baccalaureate degree (BS). Many professions (e.g., Pharmacy or Medicine) require additional post-baccalaureate education. The AS/ AA degree is intended for students who plan to use it as a first step toward a baccalaureate degree. The AS/AA degree may be granted to those who do not continue in a bachelor's program and meet the minimum requirements.

## **Total Program Credits: 60**

Gen	General Education Requirements:				
	ENGL 1010	Introduction to Academic Writing CC	3		
or	ENGH 1005	Literacies and Composition Across Contexts CC (5.0)			
	ENGL 2010	Intermediate Academic Writing CC	3		
	MATH 1050	College Algebra QL	4		
or	MATH 1055	College Algebra with Preliminaries QL (5.0)			
Com	nplete one of th	ne following:	3		
	HIST 2700	US History to 1877 AS (3.0)			
and	HIST 2710	US History since 1877 AS (3.0)			
	HIST 1700	American Civilization AS (3.0)			
	HIST 1740	US Economic History AS (3.0)			
	POLS 1000	American Heritage SS (3.0)			
	POLS 1100	American National Government AS (3.0	)		
Com	Complete the following:				

	PHIL 2050	Ethics and Values IH	3
or	PHIL 205G	Ethics and Values IH GI	
	HLTH 1100	Personal Health and Wellness TE (2.0)	
or	EXSC 1097	Fitness for Life TE	2
Dist	Distribution Courses:		
	BIOL 1610	College Biology I BB (To be taken with BIOL 1615)	4
	CHEM 1210	Principles of Chemistry I PP (To be taken with CHEM 1215)	4
	CHEM 1220	Principles of Chemistry II PP (To be taken with CHEM 1225)	4
	Humanities D	listribution	3
	Fine Arts Dist	tribution	3
	Social/Behav	ioral Science	3
Disc	ipline Core Re	equirements:	13 Credits
Com	nplete the follo	wing:	
	BIOL 1615	College Biology I Laboratory (To be taken with BIOL 1610)	1
	BIOL 1620	College Biology II	3
and	BIOL 1625	College Biology II Laboratory	1
	CHEM 1215	Principles of Chemistry I Laboratory (To be taken with CHEM 1210)	1
	CHEM 1225	Principles of Chemistry II Laboratory (To be taken with CHEM 1220)	1
	Minimum of 2 BOT, MICR, 0	additional biology courses (BIOL, or ZOOL prefixes). <sup>1</sup>	6
Elec	tive Requirem	ents:	8 Credits
	Complete any Advisor.	y course 1000 or higher. See Biology	8

Graduation Requirements:

- 1. Completion of a minimum of 60 semester credits.
- 2. Overall grade point average of 2.0 (C) or above. (Departments may require a higher GPA.)
- 3. Residency hours -- minimum of 20 credit hours through course attendance at UVU.
- 4. Completion of GE and specified departmental requirements.

### Footnote

<sup>1</sup>BIOL 1010 cannot be used to meet this requirement. See Biology Advisor.

# Biology, A.S. Careers

- 1. Demonstrate knowledge of cellular biology.
- Demonstrate a knowledge of molecular genetics and principles of inheritance.

## **Related Careers**

- Natural Sciences Managers
- Biological Scientists, All Other
- Life Scientists, All Other
- Biological Science Teachers, Postsecondary

 Secondary School Teachers, Except Special and Career/Technical Education

# **Biology**, Minor

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## Requirements

The minor is a way for students to investigate the Biology Degree.

### **Total Program Credits: 21**

Matriculation Requirements:			
1. Admitted to	a bachelor degree program at UVU.		
Discipline Core Re	equirements:	21 Credits	
Complete the follo	wing with a grade of C- or better:		
BIOL 1610	College Biology I BB	4	
BIOL 1615	College Biology I Laboratory	1	
BIOL 1620	College Biology II	3	
BIOL 1625	College Biology II Laboratory	1	
Complete 12 uppe MICR, or ZOOL co	12		

each. BIOL 489R, BIOL 499R, cannot be used to meet this requirement. <sup>1</sup>

### Notes:

1. BIOL 489R Student Research, BIOL 499R Senior Thesis, cannot be used to meet this requirement.

### Biology, Minor Careers

- 1. Apply the process of science through the use of hypothesis testing in the design and completion of scientific experiments.
- 2. Critically evaluate scientific information.
- 3. Quantitatively analyze scientific data through graph interpretation, statistical analysis, and problem solving.
- 4. Effectively communicate scientific information in both written and oral formats.
- Explain fundamental biological concepts including cell biology, genetics, evolution, ecological principles, organismal biology, and biodiversity.
- 6. Apply scientific concepts both across and outside of biology that demonstrate interdisciplinary understanding.

## **Related Careers**

- Natural Sciences Managers
- Biological Scientists, All Other
- Life Scientists, All Other
- Biological Science Teachers, Postsecondary
- Secondary School Teachers, Except Special and Career/Technical Education

# **Bioinformatics**, **B.S.**

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## Requirements

Bioinformatics is the fastest growing field in Biology. In general terms, bioinformatics is the synthesis of computational methods and biological systems and comprises many sub-fields that approach different questions in biology. A Bachelor of Science in Bioinformatics will prepare students to enter a variety of fields such as: medical informatics and interventions, new agricultural paradigms, pharmaceutical discovery, and molecular genealogy predictions, among others. This degree would provide students with the knowledge, skills, and experience to be competitive for both graduate school and employment opportunities.

### **Total Program Credits: 120**

Matriculation Requirements:

BIOL 1610 College Biology BB with C- or higher

CS 1400 Fundamentals of Programming with a C+ or higher, and

Approval of Biology Department or Computer Science Department advisor.

Gen	eral Educatior	n Requirements:	39 Credits
	ENGL 1010	Introduction to Academic Writing CC	3
or	ENGH 1005	Literacies and Composition Across Contexts CC (5)	
	ENGL 2010	Intermediate Academic Writing CC	3
	MATH 1050	College Algebra QL	4
or	MATH 1055	College Algebra with Preliminaries QL (5)	
Con	nplete one of t	ne following:	3
	HIST 2700	US History to 1877 AS (3)	
and	HIST 2710	US History since 1877 AS (3)	
	HIST 1700	American Civilization AS (3)	
	HIST 1740	US Economic History AS (3)	
	POLS 1000	American Heritage SS (3)	
	POLS 1100	American National Government AS (3)	
Con	nplete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
or	PHIL 205G	Ethics and Values IH GI (3)	
	HLTH 1100	Personal Health and Wellness TE (2)	
or	EXSC 1097	Fitness for Life TE	2
Dist	ribution Cours	es:	
	BIOL 1610	College Biology I BB	4
	CHEM 1210	Principles of Chemistry I PP	4
	CHEM 1220	Principles of Chemistry II PP	4
	Humanities D	listribution	3
	Fine Arts Dis	tribution	3
	Social/Behav	ioral Science	3
Disc	pipline Core Re	equirements:	50 Credits
	BIOL 1011	Introduction to Bioinformatics BB	3
	BIOL 1615	College Biology I Laboratory	1
	BIOL 3500	Genetics	3
	BIOL 3550	Molecular Biology	3
	BIOL 3100	Introduction to Data Analysis for Biologists	3
	BIOL 492R	Professional Development	1

	BIOL 494R	Student Seminar WE	2
	BIOL 497R	Biology Colloquium (0.5 cr, two required)	1
	BIOL 4550	Molecular Evolution and Bioinformatics WE	3
	BIOL 4600	Bioinformatics Capstone	3
	STAT 2040	Principles of Statistics QL	4
	CHEM 1215	Principles of Chemistry I Laboratory	1
	CHEM 1225	Principles of Chemistry II Laboratory	1
	CS 1400	Fundamentals of Programming	3
	CS 1410	Object Oriented Programming	3
	CS 2300	Discrete Mathematical Structures I	3
	CS 2420	Introduction to Algorithms and Data Structures	3
	CS 305G	Global Social and Ethical Issues in Computing GI WE	3
	INFO 2410	Database Fundamentals	3
	IT 1510	Introduction to System Administration Linux/UNIX	3
Elec	ctive Requirem	ents:	31 Credits
	Choose 6 cre	dits from any general electives. <sup>1</sup>	6
	Choose 25 cr advisor	redits from list below or approved by	25
	BIOL 4300	Bioinformatics and Genome Analysis (4)	
	BIOL 3700	General Ecology (3)	
	BIOL 4500	Principles of Evolution WE (3)	
	BIOL 4400	Genomics (3)	
	BIOL 489R	Student Research (1-9)	
	BIOL 490R	Special Topics in Biology (1-4)	
	BIOL 499R	Senior Thesis (1-2)	
	MICR 3200	Emerging and Re Emerging Diseases and Zoonoses (3)	
	MICR 2060	Microbiology for Health Professions BB (3)	
	MICR 3450	General Microbiology (3)	
	CS 3270	Python Software Development (3)	
	CS 3320	Numerical Software Development (3)	
	CS 3520	Database Theory (3)	
	CS 3530	Data Management For Data Sciences (3)	
	STAT 4100	Design of Experiment (3)	
	STAT 4400	Multivariate Analysis WE (3)	
	STAT 4710	Mathematical Statistics-Probability and Statistics (3)	
	STAT 4720	Mathematical Statistics-Statistical Inference (3)	
-	MATH 1210	Calculus I QL (4)	
or	MATH 121H	Calculus I QL (4)	
	MATH 1220	Calculus II (4)	

or	MATH 122H	Calculus II (4)	
	MATH 2270	Linear Algebra (3)	
	MATH 2210	Calculus III (4)	
or	MATH 222H	Calculus III (4)	

### Graduation Requirements:

- 1. Complete the required minimum credit hours.
- 2. If an AA or AS degree has been earned, a maximum of 64 of these credits may apply toward the BS.
- 3. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
- 4. A minimum of 40 credits must be upper-division (numbered 3000 or above).
- 5. A minimum of 40 credits must be in the major, 30 of which must be upper-division. A minimum of nine Department credits must be taken at UVU.
- Except for 490R Special Topics courses, a maximum cumulative total of 9 credits in any combination of upper division Departmental courses with an"R" designation may count toward graduation.
- Complete Biology Department core courses with a grade of "C-" or higher in each course.
- 8. Achieve a minimum overall GPA of 2.0 with a minimum GPA of 2.25 in biology department courses.
- 9. Complete the appropriate application for graduation form.
- 10. Successful completion of at least one Global/Intercultural course.

### Footnotes:

<sup>1</sup> Upper division is suggested to meet upper division requirements

# **Bioinformatics**, **B.S.**

### Careers

- 1. Demonstrate mastery of the core concepts of bioinformatics as derived from the associated fields of biology, computer science, mathematics, informatics, and chemistry.
- 2. Utilize existing software to extract, compile, and analyze information from large databases.
- 3. Create data science pipelines and/or computer programs that facilitate biological data analysis.
- 4. Complete a project in bioinformatics and communicate the outcomes effectively by participation in one or more of the following: an internship, a professional presentation, mentored research, or as coauthor of a peer-reviewed publication (or other approved activity).

## **Related Careers**

- · Computer and Information Research Scientists
- Software Developers, Applications
- Computer Occupations, All Other

# **Biology Education, B.S.**

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### Requirements

Biology is the study of living organisms and includes study of subjects such as evolution, ecology, zoology, physiology, anatomy, and botany among other subjects. Completion of this degree will prepare students to teach classes in high school biology, and related subjects, plus integrated science at the 7th grade level.

### Matriculation Requirements:

Admission to Professional Education status is a requirement for enrollment in professional studies level courses. Admission criteria includes:

- 1. ENGL and MATH QL courses must have a grade C or higher.
- 2. GPA of 3.0 or higher with no grade lower than a C in content area courses.
- 3. Completion of all General Education requirements and 70% of content area courses.
- 4. Pass LiveScan Criminal Background Check.

Gen	38 Credits		
	ENGL 1010	Introduction to Academic Writing CC	3
or	ENGH 1005	Literacies and Composition Across Context CC (5.0)	
	ENGL 2010	Intermediate Academic Writing CC	3
	MATH 1050	College Algebra QL	4
or	MATH 1055	College Algebra with Preliminaries QL (5.0)	
Com	plete one of th	ne following:	3
	HIST 2700	US History to 1877 AS (3.0)	
and	HIST 2710	US History since 1877 AS (3.0)	
	HIST 1700	American Civilization AS (3.0)	
	HIST 1740	US Economic History AS (3.0)	
	POLS 1000	American Heritage SS (3.0)	
	POLS 1100	American National Government AS (3.0)	
Com	plete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
or	PHIL 205G	Ethics and Values IH GI	
	HLTH 1100	Personal Health and Wellness TE (2.0)	
or	EXSC 1097	Fitness for Life TE	2
Distr	ribution Course	es	
	BIOL 1610	College Biology I BB	4
	CHEM 1110	Elementary Chemistry for the Health Sciences PP	4
	PHYS 1010	Elementary Physics PP	3
	Humanities D	istribution	3
	Fine Arts Dist	tribution	3
	Social/Behav	ioral Science Distribution	3
Disc	ipline Core Re	equirements:	88 Credits
	BIOL 1615	College Biology I Laboratory	1
	BIOL 1620	College Biology II	3
and	BIOL 1625	College Biology II Laboratory	1
Complete three of the following sequences: (MICR 2060/2065 & MICR 3450/3455 cannot both count)		12	
	MICR 2060	Microbiology for Health Professions BB (3)	
and	MICR 2065	Microbiology for Health Professions Laboratory (1)	
or	MICR 3450	General Microbiology (3)	
and	MICR 3455	General Microbiology Laboratory (1)	
or	ZOOL 3100	Vertebrate Zoology (3)	

and	ZOOL 3105	Vertebrate Zoology Laboratory (1)	
or	ZOOL 3200	Invertebrate Zoology (3)	
and	ZOOL 3205	Invertebrate Zoology Laboratory (1)	
or	BIOL 3400	Cell Biology (3)	
and	BIOL 3405	Cell Biology Laboratory (1)	
Com	nplete one of t	he following:	3
	BIOL 2500	Environmental Biology BB (3)	
	BIOL 3300	Developmental Biology (3)	
	BIOL 3800	Conservation Biology (3)	
	BIOL 4300	Bioinformatics and Genome Analysis (4)	
	BOT 2050	Field Botany BB (3)	
	BOT 2400	Plant Kingdom BB (4)	
	BOT 2100	Flora of Utah BB (3)	
	BOT 4300	Native Trees and Shrubs of Utah (3)	
	MICR 3200	Emerging and Re Emerging Diseases and Zoonoses (3)	
	ZOOL 4000	Animal Behavior (3)	
	BIOL 3500	Genetics (3)	
	BIOL 3200	Guided Research Experience (1-3)	
Com	plete the follo	wing:	
	BIOL 3700	General Ecology	3
	BIOL 4500	Principles of Evolution WE	3
	BIOL 494R	Student Seminar WE	2
	BOT 3340	Plant Biology	4
	SCIE 4210	Science Teaching Methods I	3
	SCIE 4220	Teaching Methods in Science II	3
	ZOOL 2320	Human Anatomy BB	3
and	ZOOL 2325	Human Anatomy Laboratory	1
	ZOOL 2420	Human Physiology	3
and	ZOOL 2425	Human Physiology Laboratory	1
	CHEM 1115	Elementary Chemistry Laboratory	1
	CHEM 1120	Elementary Organic Bio-Chemistry	4
and	CHEM 1125	Elementary Organic Bio-Chemistry Laboratory	1
	GEO 1010	Introduction to Geology PP	3
and	GEO 1015	Introduction to Geology Laboratory	1
Edu	cation Course	s: <sup>1</sup>	
	EDEL 1010	Introduction to Education	2
	EDSC 3000	Educational Psychology	3
	EDSC 325G	Equitable Technology Integration GI	2
	EDSP 340G	Exceptional Students GI	2
	EDSC 4200	Classroom Management I	2
	EDSC 4250	Classroom Management II	2
	EDSC 445G	Multicultural Instruction ESL GI	3
	EDSC 4440	Content Area Literacies	3
	EDSC 455G	Secondary Curriculum Instruction and Assessment GI	3

EDSC 4850	Student Teaching Secondary	8
EDSC 4990	Teacher Performance Assessment Project WE	2

# Graduation Requirements:

- 1. Complete the required minimum credit hours.
- 2. If an AA or AS degree has been earned, a maximum of 64 of these credits may apply toward the BS.
- 3. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
- 4. A minimum of 40 credits must be upper-division (numbered 3000 or above).
- A minimum of 30 credits must be in the major (BIOL, BOT, MICR, or ZOOL prefixes), courses as follows: minimum of 9 Biology credits must be taken at UVU and a minimum of 20 Biology credits must be upper-division.
- 6. Complete the appropriate application for graduation form.
- 7. Successful completion of at least one Global/Intercultural course.
- Overall Grade of 3.0 (B) or above with no grade lower than a C or better in major required content courses and no grade lower than a B- in Licensure and Methods courses.

Footnotes:

<sup>1-</sup>Must be completed with a grade of B- or higher.

# Biology Education, B.S. Careers

- 1. Demonstrate an overall knowledge of biology needed to teach in the secondary education system.
- 2. MFAT test Data in support of Overall Knowledge of Biology needed to teach in the SecondaryEducation System
- State Praxis Test Scores in support of Demonstrating overall knowledge of Biology to teach in theSecondary Education System
- 4. 90% of UVU students completing a Bachelors of Science Degree in Secondary Education in biologyand who apply for employment teaching in junior high and high schools will successfully gain employment in secondary education within one year.
- 5. Students who do gain employment in secondary education will demonstrate skill and knowledge in pedagogy.

# **Related Careers**

- Biological Science Teachers, Postsecondary
- Education Teachers, Postsecondary
- Middle School Teachers, Except Special and Career/Technical Education
- Secondary School Teachers, Except Special and Career/Technical Education

# Biology, B.S.

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# Requirements

Students interested in Biology, or related fields, are encouraged to earn at least a baccalaureate degree (BS). Many professions (e.g., Pharmacy or Medicine) require additional post -baccalaureate education. The BS degree in Biology may be used for entry into a career or in preparation for graduate (Masters/PhD) or professional schools (medical, dental, pharmacy, etc.).

BIO		Biology L with C- or higher and approva	l of Biology
Dep	artment adviso	or.	I OI DIOIOGY
Gen	eral Educatior	Requirements:	39 Credits
	ENGL 1010	Introduction to Academic Writing CC	3
or	ENGH 1005	Literacies and Composition Across Contexts CC (5)	
	ENGL 2010	Intermediate Academic Writing CC	3
	MATH 1050	College Algebra QL	4
or	MATH 1055	College Algebra with Preliminaries QL (5)	
Con	nplete one of th	ne following:	3
	HIST 2700	US History to 1877 AS	
and	HIST 2710	US History since 1877 AS (6)	
	HIST 1700	American Civilization AS (3)	
	HIST 1740	US Economic History AS (3)	
	POLS 1000	American Heritage SS (3)	
	POLS 1100	American National Government AS (3)	
Com	plete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
or	PHIL 205G	Ethics and Values IH GI (3)	
	HLTH 1100	Personal Health and Wellness TE (2)	
or	EXSC 1097	Fitness for Life TE	2
Dist	ribution Course	es:	
	BIOL 1610	College Biology I BB	4
	CHEM 1210	Principles of Chemistry I PP	4
	CHEM 1220	Principles of Chemistry II PP	4
	Humanities D	listribution	3
	Fine Arts Dist	tribution	3
	Social/Behav	ioral Science	3
Disc	ipline Core Re	equirements:	54 Credits
	BIOL 1615	College Biology I Laboratory	1
	BIOL 1620	College Biology II	3
	BIOL 1625	College Biology II Laboratory	1
	BIOL 3400	Cell Biology	3
	BIOL 3500	Genetics	3
	BIOL 3550	Molecular Biology	3
	BIOL 3600	Biological Chemistry	3
	BIOL 3700	General Ecology	3
	BIOL 4500	Principles of Evolution WE	3
	BIOL 492R	Professional Development	1
	BIOL 494R	Student Seminar WE	2
	BIOL 497R	Biology Colloquium (0.5 cr, two required)	1
Corr One only	nplete one of the course from t	ne following upper division lab courses: his category needs to be taken although is required.	1
	BIOL 3100	Introduction to Data Analysis for Biologists (3)	

	BIOL 3200	Guided Research Experience (1-3)	
	BIOL 3405	Cell Biology Laboratory (1)	
	BIOL 3515	Advanced Genetics Laboratory (1)	
	BIOL 3555	Experiments in Molecular Biology (1)	
	BIOL 4300	Bioinformatics and Genome Analysis (4)	
	BIOL 4550	Molecular Evolution and Bioinformatics WE (3)	
	MICR 3150	Microbial Ecology WE (4)	
	MICR 3455	General Microbiology Laboratory (1)	
	MICR 4505	Applied Virological Methods (3)	
	BOT 3500	Mycology (4)	
	BOT 3800	Ethnobotany WE (4)	
	BOT 4100	Plant Anatomy (4)	
	BOT 4200	Plant Systematics (3)	
	BOT 4430	Plant Pathology (3)	
	BOT 4600	Plant Physiology WE	
and	BOT 4605	Plant Physiology Laboratory (4)	
	BOT 4700	Plant Tissue Culture WE (4)	
Com	nplete one of th	ne following:	4
	STAT 2040	Principles of Statistics QL	4
or	MATH 1060	Trigonometry QL (3)	
and	MATH 1210	Calculus I QL (5)	
	PHYS 2010	College Physics I PP	4
	PHYS 2015	College Physics I Lab	1
	PHYS 2020	College Physics II PP	4
	PHYS 2025	College Physics II Lab	1
	CHEM 1215	Principles of Chemistry I Laboratory	1
	CHEM 1225	Principles of Chemistry II Laboratory	1
	CHEM 2310	Organic Chemistry I	4
	CHEM 2315	Organic Chemistry I Laboratory	1
	CHEM 2320	Organic Chemistry II	4
	CHEM 2325	Organic Chemistry II Laboratory	1
Elec	tive Requirem	ents:	27 Credits
	Choose 4 cre	dits from any MICR electives. <sup>1</sup>	4
	Choose 3 cre	dits from any BOT electives. <sup>1</sup>	3
	Choose 3 cre	dits from any ZOOL electives. <sup>1</sup>	3
	Additional cre requirements	dits to meet credit and upper-division	17

### Graduation Requirements:

- 1. Complete the required minimum credit hours.
- 2. If an AA or AS degree has been earned, a maximum of 64 of these credits may apply toward the BS.
- 3. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
- 4. A minimum of 40 credits must be upper-division (numbered 3000 or above).
- A minimum of 40 credits must be in the major (BIOL, BOT, BTEC, MICR, or ZOOL prefixes), 30 of which must be upper-division. A minimum of nine Department credits must be taken at UVU.

- Except for 490R Special Topics courses, a maximum cumulative total of 9 credits in any combination of upper division Departmental courses with an "R" designation may count toward graduation.
- Complete Biology Department core courses with a grade of "C-" or higher in each course.
- 8. Achieve a minimum overall GPA of 2.0 with a minimum GPA of 2.25 in biology department courses.
- 9. Complete the appropriate application for graduation form.
- 10. Successful completion of at least one Global/Intercultural course.

#### Footnote

<sup>1</sup>Upper division is suggested to meet upper division requirements

## Biology, B.S. Careers

- 1. Apply the process of science through the use of hypothesis testing in the design and completion of scientific experiments
- 2. Critically evaluate scientific information
- 3. Quantitatively analyze scientific data through graph interpretation, statistical analysis, and problem solving
- 4. Effectively communicate scientific information in both written and oral formats.
- Explain fundamental biological concepts including cell biology, genetics, evolution, ecological principles, organismal biology, and biodiversity
- 6. Apply scientific concepts both across and outside of biology that demonstrate interdisciplinary understanding

## **Related Careers**

- Natural Sciences Managers
- Biological Scientists, All Other
- Life Scientists, All Other
- Biological Science Teachers, Postsecondary
- Secondary School Teachers, Except Special and Career/Technical Education

# Biotechnology, B.S.

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## Requirements

The Bachelor's Degree in Biotechnology will prepare students to enter the field of research, education, pharmaceuticals, forensics, and a variety of other careers. It is also great preparation for advanced degrees in the sciences.

Gen	eral Educatior	Requirements:	39 Credits
	ENGL 1010	Introduction to Academic Writing CC	3
or	ENGH 1005	Literacies and Composition Across Context CC (5)	
	ENGL 2010	Intermediate Academic Writing CC	3
	MATH 1050	College Algebra QL	4
or	MATH 1055	College Algebra with Preliminaries QL	
Corr	nplete one of th	ne following:	3
	HIST 2700	US History to 1877 AS (3)	
and	HIST 2710	US History since 1877 AS (3)	
	HIST 1700	American Civilization AS (3)	

	HIST 1740	US Economic History AS (3)	
	POLS 1000	American Heritage SS (3)	
	POLS 1100	American National Government AS (3)	
Con	nplete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
	HLTH 1100	Personal Health and Wellness TE (2)	
or	EXSC 1097	Fitness for Life TE	2
Dist	ribution Cours	es:	
	BIOL 1610	College Biology I BB	4
	CHEM 1210	Principles of Chemistry I PP	4
	CHEM 1220	Principles of Chemistry II PP	4
	Humanities D	Distribution	3
	Fine Arts Dis	tribution	3
	Social/Behav	ioral Science	3
Disc	cipline Core Re	equirements:	73 Credits
	BIOL 1615	College Biology I Laboratory	1
	BIOL 3400	Cell Biology	3
	BIOL 3500	Genetics	3
	BIOL 3550	Molecular Biology	3
	BIOL 3600	Biological Chemistry	3
	BIOL 4550	Molecular Evolution and Bioinformatics WE	3
	BTEC 494R	Student Seminar WE	2
	Choose any 2 complete at le exceeds the	2 from the following. Student must east 2 of the courses listed even if it required 3 credit hours.	3
	BIOL 3515	Advanced Genetics Laboratory (1)	
	BIOL 3605	Biological Chemistry Lab (1)	
	BIOL 3405	Cell Biology Laboratory (1)	
	BIOL 3100	Introduction to Data Analysis for Biologists (3)	
	BIOL 3555	Experiments in Molecular Biology (1)	
	CHEM 3005	Analytical Chemistry Laboratory (2)	
	BTEC 3300	Biomolecular Modeling and Simulations (4)	
	BOT 4700	Plant Tissue Culture WE (4)	
	ZOOL 4300	Histology (4)	
	Choose any f	rom the following:	8
	BTEC 481R	Biotechnology Internship (1-10)	
	BIOL 489R	Student Research (1-4)	
	BTEC 489R	Student Research (1-4)	
	BTEC 499R	Senior Thesis (1-2)	
	Choose from from the follo	1 MICR course and accompanying lab wing:	4
	MICR 3450	General Microbiology (3) (***Recommended***)	
	MICR 3455	General Microbiology Laboratory (1)	
	MICR 2060	Microbiology for Health Professions BB (3)	

	MICR 2065	Microbiology for Health Professions Laboratory (1)	
	Complete the	following:	
	STAT 2040	Principles of Statistics QL	4
	PHYS 2010	College Physics I PP	4
	PHYS 2015	College Physics I Lab	1
	PHYS 2020	College Physics II PP	4
	PHYS 2025	College Physics II Lab	1
	CHEM 1215	Principles of Chemistry I Laboratory	1
	CHEM 1225	Principles of Chemistry II Laboratory	1
	CHEM 2310	Organic Chemistry I	4
	CHEM 2315	Organic Chemistry I Laboratory	1
	CHEM 2320	Organic Chemistry II	4
	CHEM 2325	Organic Chemistry II Laboratory	1
	BTEC 1010	Fundamentals of Biotechnology I Career Survey BB	3
	BTEC 2010	DNA Manipulation and Analysis	3
	BTEC 2020	Protein Purification and Analysis	3
	BTEC 2030	Cell Culture Techniques	2
	BTEC 2040	Advanced Nucleic Acid Laboratory	3
Elec	tive Requirem	ents:	12 Credits
	Additional cre requirements	edits to meet credit and upper-division	12

### **Graduation Requirements:**

- 1. Complete the required minimum credit hours.
- 2. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
- 3. A minimum of 40 credits must be upper-division (numbered 3000 or above).
- 4. Complete core courses with a grade of "C" or higher in each BTEC course and a "C-" or higher in all other core courses.
- 5. Achieve a minimum overall GPA of 2.0 with a minimum GPA of 2.25 in core courses.
- 6. Successful completion of at least one Global/Intercultural course.

# Biotechnology, B.S.

## Careers

- 1. Apply the process of science through the use of hypothesis testing in the design and completion of scientific experiments.
- 2. Critically evaluate scientific information.
- Quantitatively analyze scientific data through graph interpretation, statistical analysis, and problem solving. Effectively communicate scientific information in both written and oral formats.
- 4. Explain fundamental biological concepts including molecular biology, biochemistry, cell biology, genetics, and evolution.

# **Related Careers**

- Natural Sciences Managers
- · Biological Scientists, All Other
- Biological Science Teachers, Postsecondary

# Botany, B.S.

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than provided, you may contact the Assistive Technology Center at ACCESSIBLETECH@uvu.edu or 801-863-6788.

## Requirements

Students interested in botany, or related fields, are strongly encouraged to earn at least a baccalaureate degree (BS). To be competitive in the job market additional post-baccalaureate education is suggested. The BS degree in Botany may be used for entry into a career or in preparation for graduate (Masters/ PhD) or professional schools (medical, pharmacy etc.).

### **Total Program Credits: 120**

- Matriculation Requirements:
  - 1. BIOL 1610 College Biology I BB with C- or higher and approval of Biology Department adviser.

Gen	eral Education	n Requirements:	39 Credits
	ENGL 1010	Introduction to Academic Writing CC	3
or	ENGH 1005	Literacies and Composition Across Context CC (5)	
	ENGL 2010	Intermediate Academic Writing CC	3
	MATH 1050	College Algebra QL	4
or	MATH 1055	College Algebra with Preliminaries QL (5)	
Con	nplete one of th	he following:	3
	HIST 2700	US History to 1877 AS (3)	
and	HIST 2710	US History since 1877 AS (3)	
	HIST 1700	American Civilization AS (3)	
	HIST 1740	US Economic History AS (3)	
	POLS 1000	American Heritage SS (3)	
	POLS 1100	American National Government AS (3)	
Con	nplete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
or	PHIL 205G	Ethics and Values IH GI	
	HLTH 1100	Personal Health and Wellness TE (2)	
or	EXSC 1097	Fitness for Life TE	2
Dist	ribution Cours	es:	
	BIOL 1610	College Biology I BB	4
	CHEM 1210	Principles of Chemistry I PP	4
	CHEM 1220	Principles of Chemistry II PP	4
	Humanities D	Distribution	3
	Fine Arts Dis	tribution	3
	Social/Behav	ioral Science	3
Disc	ipline Core Re	equirements:	63 Credits
	BIOL 1615	College Biology I Laboratory	1
	BIOL 1620	College Biology II	3
	BIOL 1625	College Biology II Laboratory	1
	BIOL 3400	Cell Biology	3
	BIOL 3500	Genetics	3
	BIOL 4500	Principles of Evolution WE	3
	BIOL 492R	Professional Development	1
	BIOL 494R	Student Seminar WE	2

BOT 2100Flora of Utah BB3orBOT 2050Field Botany BB (3)orBOT 2400Plant Kingdom BB4IBOT 4050Plant Ecology3IBOT 4050Plant Ecology Laboratory1IBOT 4100Plant Anatomy4IBOT 4200Plant Anatomy3IBOT 4100Plant Anatomy4IBOT 4200Plant Anatomy3IBOT 4300Native Trees and Shrubs of Utah3IBOT 4500Introduction to Grasses (3)3IBOT 4600Plant Physiology WE3IBOT 4605Plant Physiology Laboratory1ICHEM 1215Principles of Chemistry I Laboratory1ICHEM 1225Principles of Statistics QL4ICHEM 2310Organic Chemistry I Laboratory1IGranic Chemistry I Laboratory11ICHEM 2310Organic Chemistry I Laboratory1IMATH 1060Trigonometry QL (3)3IMICR 3450General Microbiology Laboratory1IMICR 3455General Microbiology Laboratory1IPHYS 2010College Physics I PP4IHYS 2015College Physics I Lab1IErectirs to meet credit and upper-division18		BIOL 497R	Biology Colloquium (0.5 cr, two required)	1
orBOT 2050Field Botany BB (3)Image: BOT 24000Plant Kingdom BB4BOT 4050Plant Ecology3Image: BOT 4050Plant Ecology Laboratory1Image: BOT 4050Plant Anatomy4Image: BOT 4200Plant Anatomy4Image: BOT 4200Plant Systematics3Image: BOT 4200Plant Systematics3Image: BOT 4300Native Trees and Shrubs of Utah3Image: BOT 4500Introduction to Grasses (3)1Image: BOT 4600Plant Physiology WE3Image: BOT 4600Plant Physiology Laboratory1Image: BOT 4605Plant Physiology Laboratory1Image: BOT 4605Plant Physiology Laboratory1Image: BOT 4605Plant Physiology Laboratory1Image: BOT 4605Plant Chemistry I Laboratory1Image: BOT 4605Organic Chemistry I Laboratory1Image: BOT 4200Organic Chemistry I Laboratory1Image: BOT 4200Principles of Statistics QL4Image: BOT 4200Principles of Statistics QL4Image: BOT 4200Calculus I QL (5)Image: Bot 1Image: BOT 4305General Microbiology Laboratory1Image: BOT 4305General Microbiology Laboratory1Image: BOT 4305Gollege Physics I PP4Image: BOT 4305College Physics I Lab1Image: BOT 4305College Physics I Lab1Image: BOT 4305College Physics I Lab18Image		BOT 2100	Flora of Utah BB	3
BOT 2400Plant Kingdom BB4BOT 4050Plant Ecology3BOT 4055Plant Ecology Laboratory1BOT 4055Plant Anatomy4BOT 4100Plant Anatomy4BOT 4200Plant Systematics3BOT 4300Native Trees and Shrubs of Utah3orBOT 4500Introduction to Grasses (3)3orBOT 4600Plant Physiology WE3andBOT 4600Plant Physiology Laboratory1c HEM 1215Principles of Chemistry I Laboratory1c HEM 1225Principles of Chemistry I Laboratory1c HEM 2310Organic Chemistry I Laboratory1c HEM 2310Organic Chemistry I Laboratory1c HEM 2315Organic Chemistry I Laboratory1orMATH 1000Trigonometry QL (3)1andMATH 1210Calculus I QL (5)1andMICR 3450General Microbiology Laboratory1andMICR 3450General Microbiology Laboratory1andMICR 3450General Microbiology Laboratory1andMICR 3455College Physics I PP4c HYS 2015College Physics I Lab1c HYS 2015College Physics I Lab18c Hattional crists to meet credit and upper-division18	or	BOT 2050	Field Botany BB (3)	
BOT 4050Plant Ecology3BOT 4055Plant Ecology Laboratory1BOT 4050Plant Anatomy4BOT 4100Plant Anatomy4BOT 4200Plant Systematics3BOT 4300Native Trees and Shrubs of Utah3orBOT 4500Introduction to Grasses (3)3orBOT 4600Plant Physiology WE3andBOT 4600Plant Physiology Laboratory1c HEM 1215Principles of Chemistry I Laboratory1c HEM 1225Principles of Chemistry I Laboratory1c HEM 2310Organic Chemistry I Laboratory1c HEM 2310Organic Chemistry I Laboratory1c HEM 2315Organic Chemistry I Laboratory1orMATH 1060Trigonometry QL (3)1andMATH 1210Calculus I QL (5)1andMICR 3450General Microbiology Laboratory1andMICR 3450General Microbiology Laboratory1andPHYS 2010College Physics I Lab1c HEY 2015College Physics I Lab1c HYS 2015College Physics I Lab18c Hittis to meet credit and upper-division requirements. 118		BOT 2400	Plant Kingdom BB	4
BOT 4055Plant Ecology Laboratory1BOT 4100Plant Anatomy4BOT 4200Plant Systematics3BOT 4200Plant Systematics of Utah3orBOT 4500Introduction to Grasses (3)TBOT 4600Plant Physiology WE3andBOT 4600Plant Physiology Laboratory1CHEM 1215Principles of Chemistry I Laboratory1CHEM 1225Principles of Chemistry I Laboratory1CHEM 2310Organic Chemistry I Laboratory1CHEM 2315Organic Chemistry I Laboratory1CHEM 2316Organic Chemistry I Laboratory4orMATH 1200Claculus I QL (3)andMATH 1210Calculus I QL (5)3andMICR 3450General Microbiology Laboratory1andMICR 3450College Physics I PP4Eletter Requirements:1818		BOT 4050	Plant Ecology	3
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BOT 4300Native Trees and Shrubs of Utah3orBOT 4500Introduction to Grasses (3)Image: BOT 4600Plant Physiology WE3andBOT 4605Plant Physiology Laboratory1Image: CHEM 1215Principles of Chemistry I Laboratory1Image: CHEM 1225Principles of Chemistry I Laboratory1Image: CHEM 2310Organic Chemistry I Laboratory4Image: CHEM 2315Organic Chemistry I Laboratory1Image: CHEM 2315Organic Chemistry I Laboratory4Image: CHEM 2315Organic Chemistry I Laboratory1Image: CHEM 2315Organic Chemistry I Laboratory3Image: CHEM 2315General Microbiology Laboratory3Image: CHEM 2315Orlege Physics I Lab1Image: CHEM 2315College Physics I Lab1Image: CHEM 2315College Physics I Lab18Image: CHEM 2315Additional credits to meet credit and upper-division18		BOT 4200	Plant Systematics	3
orBOT 4500Introduction to Grasses (3)BOT 4600Plant Physiology WE3andBOT 4605Plant Physiology Laboratory1Image: CHEM 1215Principles of Chemistry I Laboratory1CHEM 1225Principles of Chemistry I Laboratory1Image: CHEM 2310Organic Chemistry I Laboratory4Image: CHEM 2310Organic Chemistry I Laboratory1Image: CHEM 2310Organic Chemistry I Laboratory4Image: CHEM 2310Organic Chemistry I Laboratory1Image: CHEM 2310Organic Chemistry I Laboratory4Image: CHEM 2310Organic Chemistry I Laboratory3Image: CHEM 2310Calculus I QL (3)Image: CHEM 23Image: CHEM 2310General Microbiology Laboratory3Image: CHEM 2310College Physics I PP4Image: CHEM 23115College Physics I Lab1Image: CHEM 23115College Physics I Lab18Image: CHEM 23115Chemet credit and upper-division18		BOT 4300	Native Trees and Shrubs of Utah	3
BOT 4600Plant Physiology WE3andBOT 4605Plant Physiology Laboratory1CHEM 1215Principles of Chemistry I Laboratory1CHEM 1225Principles of Chemistry I Laboratory1CHEM 2310Organic Chemistry I Laboratory4CHEM 2315Organic Chemistry I Laboratory1CHEM 2315Organic Chemistry I Laboratory1CHEM 2315Organic Chemistry I Laboratory1STAT 2040Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)3andMICR 3450General Microbiology Laboratory1MICR 3455General Microbiology Laboratory1PHYS 2010College Physics I Lab1Eletter Requirements:18 CreditsAdditional credits to meet credit and upper-division requirements.118	or	BOT 4500	Introduction to Grasses (3)	
andBOT 4605Plant Physiology Laboratory1CHEM 1215Principles of Chemistry I Laboratory1CHEM 1225Principles of Chemistry II Laboratory1CHEM 2310Organic Chemistry I Laboratory4CHEM 2315Organic Chemistry I Laboratory1CHEM 2315Organic Chemistry I Laboratory1CHEM 2315Organic Chemistry I Laboratory1Marth 020Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)3andMICR 3450General Microbiology3andMICR 3450General Microbiology Laboratory1andPHYS 2010College Physics I PP4Eletter Requirements:18 Credits		BOT 4600	Plant Physiology WE	3
CHEM 1215Principles of Chemistry I Laboratory1CHEM 1225Principles of Chemistry II Laboratory1CHEM 2310Organic Chemistry I Laboratory4CHEM 2315Organic Chemistry I Laboratory1STAT 2040Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)3MICR 3450General Microbiology Laboratory1MICR 3455General Microbiology Laboratory1PHYS 2010College Physics I PP4Elettre Requirements:18 Credits	and	BOT 4605	Plant Physiology Laboratory	1
CHEM 1225Principles of Chemistry II Laboratory1CHEM 2310Organic Chemistry I4CHEM 2315Organic Chemistry I Laboratory1STAT 2040Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)3MICR 3450General Microbiology3andMICR 3455General Microbiology Laboratory1PHYS 2010College Physics I PP4Elector Requirements:18 Credits		CHEM 1215	Principles of Chemistry I Laboratory	1
CHEM 2310Organic Chemistry I4CHEM 2315Organic Chemistry I Laboratory1STAT 2040Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)1MICR 3450General Microbiology Laboratory3andMICR 3455General Microbiology Laboratory1PHYS 2010College Physics I PP4PHYS 2015College Physics I Lab1Elector Requirements:18 Credits		CHEM 1225	Principles of Chemistry II Laboratory	1
CHEM 2315Organic Chemistry I Laboratory1STAT 2040Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)IMICR 3450General Microbiology3andMICR 3455General Microbiology Laboratory1PHYS 2010College Physics I PP4Elective Requirements:18 CreditsAdditional credits to meet credit and upper-division requirements.18		CHEM 2310	Organic Chemistry I	4
STAT 2040Principles of Statistics QL4orMATH 1060Trigonometry QL (3)andMATH 1210Calculus I QL (5)I $MICR 3450$ General Microbiology3andMICR 3455General Microbiology Laboratory1 $PHYS 2010$ College Physics I PP4 $PHYS 2015$ College Physics I Lab1 $Elective Requirements:$ 18 Credits		CHEM 2315	Organic Chemistry I Laboratory	1
or         MATH 1060         Trigonometry QL (3)           and         MATH 1210         Calculus I QL (5)         Image: Calculus I QL (5)           MICR 3450         General Microbiology         3           and         MICR 3455         General Microbiology Laboratory         1           PHYS 2010         College Physics I PP         4           PHYS 2015         College Physics I Lab         1           Elective Requirements:         18 Credits           Additional credits to meet credit and upper-division requirements. <sup>1</sup> 18		STAT 2040	Principles of Statistics QL	4
and       MATH 1210       Calculus I QL (5)       Image: Calculus I QL (5)         MICR 3450       General Microbiology       3         and       MICR 3455       General Microbiology Laboratory       1         PHYS 2010       College Physics I PP       4         PHYS 2015       College Physics I Lab       1         Elective Requirements:       18 Credits         Additional credits to meet credit and upper-division requirements.       18	or	MATH 1060	Trigonometry QL (3)	
MICR 3450       General Microbiology       3         and       MICR 3455       General Microbiology Laboratory       1         PHYS 2010       College Physics I PP       4         PHYS 2015       College Physics I Lab       1         Elective Requirements:       18 Credits         Additional credits to meet credit and upper-division requirements.       18	and	MATH 1210	Calculus I QL (5)	
and     MICR 3455     General Microbiology Laboratory     1       PHYS 2010     College Physics I PP     4       PHYS 2015     College Physics I Lab     1       Elective Requirements:     18 Credits       Additional credits to meet credit and upper-division requirements.     18		MICR 3450	General Microbiology	3
PHYS 2010     College Physics I PP     4       PHYS 2015     College Physics I Lab     1       Elective Requirements:     18 Credits       Additional credits to meet credit and upper-division requirements.     18	and	MICR 3455	General Microbiology Laboratory	1
PHYS 2015     College Physics I Lab     1       Elective Requirements:     18 Credits       Additional credits to meet credit and upper-division requirements.     18		PHYS 2010	College Physics I PP	4
Elective Requirements: 18 Credits Additional credits to meet credit and upper-division requirements. 1		PHYS 2015	College Physics I Lab	1
Additional credits to meet credit and upper-division 18 requirements. <sup>1</sup>	Elec	tive Requirem	ents:	18 Credits
		Additional cre requirements	dits to meet credit and upper-division .1	18

#### Notes:

1. ENVT 2630 and ENVT 3630 are suggested electives. BOT 3340 cannot count for credit towards the Botany degree

### Graduation Requirements:

- 1. Complete the required minimum credit hours.
- 2. Completion of GE and specified departmental requirements.
- 3. If an AA or AS degree has been earned, a maximum of 64 of these credits may apply toward the BS.
- 4. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
- 5. A minimum of 40 credits must be upper-division (numbered 3000 or above).
- A minimum of 40 credits must be in the Biology Department (BIOL, BOT, BTEC, MICR, or ZOOL prefixes), 30 of which must be upper-division. A minimum of nine Biology Department credits must be taken at UVU.
- 7. Complete discipline core courses with a grade of "C-" or higher in each course.
- 8. Except for 490R Special Topics courses, a maximum cumulative total of 9 credits in any combination of upper division Departmentalcourses with an "R" designation may count toward graduation.
- 9. Achieve a minimum overall GPA of 2.0 with a minimum GPA of 2.25 in Biology Department courses.
- 10. Complete the appropriate application for graduation form.
- 11. Successful completion of at least one Global/Intercultural course.

# Botany, B.S. *Careers*

- 1. Demonstrate critical thinking and analytical skills.
- Demonstrate knowledge of cellular and organismal biology (including plant anatomy, physiology anddiversity), population biology, evolution and ecology(emphasizing organisms' interdependency for survival and for quality of life in the biosphere)
- 70% of the students successfully completing a Bachelors of Science in Biology and taking the GRE examination will score in the 50 percentile or better.
- Biology graduates applying to post-graduate studies will be accepted into graduate or professionalschools, or if applying for employment in any area related to botany will be hired.

# **Related Careers**

- Natural Sciences Managers
- Biological Scientists, All Other
- Biological Science Teachers, Postsecondary

# Microbiology, B.S.

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# Requirements

Microbiology is the study of microorganisms, the smallest living things on earth, including bacteria, viruses, fungi, protozoa, and algae. While microorganisms are most known for their ability to cause disease, they are actually ubiquitous on earth and central to many of the essential life processes on this planet. The field of microbiology is a major contributor to human, animal, plant, and environmental health as well as central to the food/beverage, biotechnology, bioremediation, and pharmaceutical industries. This curriculum will examine the diverse roles of microorganisms and cover the fundamentals of microbial diversity, physiology, and genetics. Students will examine the roles and interactions of microbial populations in aquatic, terrestrial, human, animal, and plant systems.

A degree in microbiology can open the door to a wide variety of careers in different industries. Studying microbiology will prepare students to go to medical, dental, veterinary, or graduate school, and also provides them a highly employable career option in healthcare, industry, or government agencies. A degree in microbiology allows students to easily enter the workforce or continue on to a professional or graduate program.

Mat	Matriculation Requirements:			
BIO Biol	BIOL 1610 College Biology I BB with C- or higher and approval of Biology Department advisor.			
Ger	eral Educatior	n Requirements:	39 Credits	
	ENGL 1010	Introduction to Academic Writing CC	3	
or	ENGH 1005	Literacies and Composition Across Contexts CC (5)		
	ENGL 2010	Intermediate Academic Writing CC	3	
	MATH 1050	College Algebra QL	4	
or	MATH 1055	College Algebra with Preliminaries QL (5)		
Con	nplete one of th	ne following:	3	
	HIST 2700	US History to 1877 AS (3)		

and	HIST 2710	US History since 1877 AS (3)	
	HIST 1700	American Civilization AS (3)	
	HIST 1740	US Economic History AS (3)	
	POLS 1000	American Heritage SS (3)	
	POLS 1100	American National Government AS (3)	
Corr	nplete the follo	wing:	
	PHIL 2050	Ethics and Values IH	3
	PHIL 205G	Ethics and Values IH GI	
	HLTH 1100	Personal Health and Wellness TE (2)	
or	EXSC 1097	Fitness for Life TE	2
Dist	ribution Course	es:	
	BIOL 1610	College Biology I BB	4
	CHEM 1210	Principles of Chemistry I PP	4
	CHEM 1220	Principles of Chemistry II PP	4
	Humanities D	listribution	3
	Fine Arts Dist	tribution	3
	Social/Behav	ioral Science	3
Disc	ipline Core Re	equirements:	53 Credits
	BIOL 1615	College Biology I Laboratory	1
	BIOL 1620	College Biology II	3
	BIOL 1625	College Biology II Laboratory	1
	MICR 3150	Microbial Ecology WE	4
	MICR 3450	General Microbiology	3
	MICR 3455	General Microbiology Laboratory	1
	MICR 3550	Microbial Physiology	4
	MICR 3650	Microbial Genetics	4
	MICR 494R	Student Seminar WE	2
	BIOL 492R	Professional Development	1
	BIOL 497R	Biology Colloquium (0.5 cr, two required)	1
	BIOL 3600	Biological Chemistry	3
	BIOL 3605	Biological Chemistry Lab	1
	BIOL 4500	Principles of Evolution WE	3
	PHYS 2010	College Physics I PP	4
	PHYS 2015	College Physics I Lab	1
	CHEM 1215	Principles of Chemistry I Laboratory	1
	CHEM 1225	Principles of Chemistry II Laboratory	1
	CHEM 2310	Organic Chemistry I	4
	CHEM 2315	Organic Chemistry I Laboratory	1
	CHEM 2320	Organic Chemistry II	4
	CHEM 2325	Organic Chemistry II Laboratory	1
	MATH 1100	Survey of Calculus QL	4
Elec	tive Requirem	ents:	28 Credits
	Choose a mir division cours division credi	nimum of 18 credits from: (Upper ses are encouraged to meet upper t requirements)	18
	MICR 3200	Emerging and Re Emerging Diseases and Zoonoses (3)	

MICR 4100	Parasitology (4)	
MICR 4200	Microbiomes (3)	
MICR 4300	Pathogenic Microbiology (4)	
MICR 4450	Immunology (3)	
MICR 4455	Immunology Laboratory (1)	
MICR 4500	Virology (3)	
MICR 4505	Applied Virological Methods (3)	
MICR 4600	Arthropod-Borne Pathogens (3)	
MICR 490R	Special Topics in Microbiology (1)	
BIOL 3400	Cell Biology (3)	
BIOL 3405	Cell Biology Laboratory (1)	
BIOL 3550	Molecular Biology (3)	
BIOL 3555	Experiments in Molecular Biology (1)	
BIOL 4550	Molecular Evolution and Bioinformatics WE (3)	
BTEC 1010	Fundamentals of Biotechnology I Career Survey BB (3)	
BTEC 2010	DNA Manipulation and Analysis (3)	
BTEC 2020	Protein Purification and Analysis (3)	
BTEC 2030	Cell Culture Techniques (2)	
BTEC 2040	Advanced Nucleic Acid Laboratory (3)	
BOT 3500	Mycology (4)	
BOT 4430	Plant Pathology (3)	
CHEM 3020	Environmental Chemistry (3)	
CHEM 3025	Environmental Chemistry Laboratory (1)	
ENVT 1270	Environmental Microbiology (3)	
Choose 6 cre	dits from:	6
MICR 489R	Student Research (1-4)	
BIOL 3100	Introduction to Data Analysis for Biologists (3)	
BIOL 369R	Introduction to Undergraduate Research (1)	
BIOL 4300	Bioinformatics and Genome Analysis (4)	
Choose 4 cre	dits from BIOL, BOT, BTEC, ZOOL, or	4

### Graduation Requirements:

- 1. Complete the required minimum credit hours.
- 2. If an AA or AS degree has been earned, a maximum of 64 of these credits may apply toward the BS.
- 3. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
- 4. A minimum of 40 credits must be upper-division (numbered 3000 or above).
- 5. A minimum of 40 credits must be in the Biology Department (BIOL, BOT, BTEC, MICR, or ZOOL prefixes), 30 of which must be upper-division. Aminimum of nine Department credits must be taken at UVU.
- Except for 490R Special Topics courses, a maximum cumulative total of 13 credits in any combination of upper division Departmental courses withan "R" designation may count toward graduation.

- Complete Biology Department core courses with a grade of "C-" or higher in each course.
- 8. Achieve a minimum overall GPA of 2.0 with a minimum GPA of 2.25 in biology department courses.
- 9. Complete the appropriate application for graduation form.
- 10. Successful completion of at least one Global/Intercultural course.

## Footnotes:

<sup>1</sup> Upper division is suggested to meet upper division requirements

# Microbiology, B.S.

# Careers

- 1. Apply the process of science through the use of hypothesis testing in the design and completion of scientific experiments
- 2. Critically evaluate scientific information
- 3. Quantitatively analyze scientific data through graph interpretation, statistical analysis, and problem solving
- 4. Effectively communicate scientific information in both written and oral formats.
- 5. Explain fundamental microbiological concepts including microbial genetics and molecular biology, ecology and environmental microbiology, and physiology and biochemistry

## **Related Careers**

- Natural Sciences Managers
- Microbiologists
- Biological Science Teachers, Postsecondary