

BS in Microbiology (285120) MAP Sheet

Life Sciences, Microbiology and Molecular Biology

For students entering the degree program during the 2024-2025 curricular year.



University Core and Graduation Requirements				Suggested Sequence of Courses			
University Core Requirements:				FRESHMAN YEAR			
Requirements	#Classes	Hours	Classes	1st Semester		5th Semester	
Religion Cornerstones				First-year Writing or American Heritage*	3.0	Religion elective*	2.0
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	Religion Cornerstone course	2.0	CHEM 351 or CHEM 285	3.0-4.0
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	MMBIO 121 or CELL 120 or BIO 130	3.0-4.0	MATH 112 or MATH 119 or STAT 121	3.0-4.0
Foundations of the Restoration	1	2.0	REL C 225	CHEM 105	4.0	Requirement 3 choice	3.0-4.0
The Eternal Family	1	2.0	REL C 200	UNIV 101	2.0	Major elective (Requirement 7)	3.0
				Total Hours	14-15.0	Total Hours	14-17.0
BYU Foundations for Student Success				2nd Semester		6th Semester	
BYU Foundations (complete during the first semester)	1	2.0	UNIV 101	First-year Writing or American Heritage*	3.0	Religion elective*	2.0
	1-2	3-6.0	from approved list	Religion Cornerstone course	2.0	Requirement 3 choice	3.0-4.0
The Individual and Society	1	3.0	from approved list	MMBIO 151	4.0	Major electives (Requirement 7)	6.0
American Heritage	1	3.0	from approved list	CHEM 106	3.0	General elective	3.0
Global and Cultural Awareness	1	3.0	WRTG 316	CHEM 107	1.0	Total Hours	14-15.0
Skills				Arts or Letters elective*	3.0	SENIOR YEAR	
First Year Writing	1	3-4.0	recommended	Total Hours	16.0	7th Semester	
Advanced Written and Oral Communications	1	3-4.0	STAT 121*, MATH 112*, or MATH 119*	SOPHOMORE YEAR		Religion elective*	2.0
	1	3-4.0	STAT 121*, MATH 112*, or MATH 119*	3rd Semester		Major elective (Requirement 7)	3.0
Quantitative Reasoning				Religion Cornerstone course	2.0	Requirement 3 choice	2-4.0
Languages of Learning (Math or Language)	1	3.0	from approved list	MMBIO 240	3.0	Adv. Written & Oral Communication	3.0
	1	3.0	from approved list	MMBIO 241	1.0	Arts or Letters elective	3.0
Arts, Letters, and Sciences (complete 6 of 7)				PHSCS 105	3.0	Total Hours	13-15.0
Civilization 1	1	3.0	from approved list	Civilization 1 elective	3.0	8th Semester	
Civilization 2	1	3.0	from approved list	Social Science elective*	3.0	Open electives	8.0
Arts	1	3.0	from approved list	Total Hours	15.0	Global and Cultural Awareness*	3.0
Letters	1-2	3.0-7.0	BIO 130*, PDBIO 120*, or MMBIO 121*	4th Semester		Requirement 3 choice	3.0
Biological Science	1	3.0	CHEM 105* and PHSCS 105*	Religion Cornerstone course	2.0	Total Hours	14.0
Physical Science	1	3.0	from approved list	MMBIO 261	3.0		
Social Science	3-4	6.0	from approved list	Major elective (Requirement 7)	3.0		
Core Enrichment: Electives	Variable	Variable	personal choice	Civilization 2 elective*	3.0		
Religion Electives				Languages of Learning (MATH or language)	3.0-4.0		
Open Electives				Total Hours	14-15.0		
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (14-15 hours overlap)				+Quantitative Reasoning can be fulfilled by ACT Math subscore of 22 or higher.			
		30.0		Note: Students are encouraged to complete an average of 15 credit hours each semester or 30 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the cost and the number of semesters to graduate.			
		120.0		*Double counting options available for some GE courses			
Graduation Requirements:							
Minimum residence hours required							
Minimum hours needed to graduate							

Program Requirements

Requirement 1 — Complete 1 of 3 Cours

BIO 130 - Biology 4.0

CELL 120 - Science of Biology 3.0

MMBIO 121 - Gen Biology: Health & Disease 3.0

Requirement 2 — Complete 4 Courses

MMBIO 151 - Microbiology 4.0

MMBIO 240 - Molecular Biology 3.0

MMBIO 241 - Molecular & Cellular Bio Lab 1.0

MMBIO 261 - Infection & Immunity 3.0

Requirement 3 — Complete 12 hours

MMBIO 360 - Bacterial Genetics 4.0

MMBIO 363 - Microbial Ecology 2.0

MMBIO 364 - Bacterial Pathogenesis 3.0

MMBIO 366 - Microbial Ecology Lab 1.0

MMBIO 385 - Phage Genetics 3.0

MMBIO 418 - Medical Parasitology 2.0

MMBIO 461 - Advanced Bacterial Physiology 3.0

MMBIO 463 - Immunology 3.0

MMBIO 465 - Virology 3.0

MMBIO 466 - Virology Laboratory 1.0

MMBIO 467 - Immunology Lab 1.0

Requirement 4 — Complete 4 Courses

CHEM 105 - Gen College Chem 1+Lab Integr 4.0

CHEM 106 - General College Chemistry 2 3.0

CHEM 107 - Gen Coll Chem Lab 1.0

PHSCS 105 - General Physics 1 3.0

Requirement 5 — Complete 1 of 2 Courses

CHEM 285 - Intro Bio-organic Chemistry 4.0

CHEM 351 - Organic Chemistry 1 3.0

Requirement 6 — Complete 1 of 2 Courses

MATH 112 - Calculus 1 4.0

STAT 121 - Intro to Stat Data Analysis 3.0

Requirement 7 — Complete 14 hours

A course used to fulfil requirements 1-6 may not be used to fulfil requirement

7. For certain elective courses, a limited number of credit hours can count towards this elective requirement.

Option 7.1 — Complete at least 10 hours up to 14 hours

BIO 165 - Introduction to Bioinformatics 3.0

BIO 250 - Evolutionary Medicine 2.0

BIO 264 - Stat Analysis for Biologists 4.0

BIO 350 - Ecology 3.0

BIO 420 - Evolutionary Biology 4.0

BIO 463 - Genetics of Human Disease 3.0

CELL 305 - Human Physiology 4.0

CELL 325 - Tissue Biology (with lab) 3.0

CELL 360 - Cell Biology 3.0

CELL 362 - Advanced Physiology 3.0

CELL 363 - Adv Physiology Lab 1.0

CHEM 351 - Organic Chemistry 1 3.0

CHEM 352 - Organic Chemistry 2 3.0

CHEM 353 - Organic Chem Lab-Nonmajors 1.0v

CHEM 481 - Biochemistry 3.0

CHEM 482 - Mechanisms of Molecular Biol 3.0

MMBIO 110R - Extremophiles - *You may take once* 1.0

MMBIO 122 - Gen Biol: Health/Disease Lab 1.0

MMBIO 162R - Careers in Biomed Sciences - *You may take once* 1.0

MMBIO 194 - Phage Discovery 3.0

MMBIO 195 - Phage Comparative Genomics 3.0

MMBIO 294R - Mentored Research - *You may take up to 2.0 credit hours* 0.5v

MMBIO 350 - Genetic Counseling 3.0

MMBIO 360 - Microbial Genetics 4.0

MMBIO 364 - Bacterial Pathogenesis 3.0

MMBIO 366 - Microbial Ecology Lab 1.0

MMBIO 390R - Readings in Molecular Biology - *You may take up to 1.0 credit hours* 1.0

MMBIO 399R - Academic Internship - *You may take up to 4.0 credit hours* 1.0v

MMBIO 409 - Hematology 3.0

MMBIO 411 - Molecular Diagnostics 3.0

MMBIO 441 - Adv Molecular Biology 3.0

MMBIO 442 - Adv Molecular Biology Lab 2.0

MMBIO 461 - Advanced Bacterial Physiology 3.0

MMBIO 463 - Immunology 3.0

MMBIO 465 - Virology 3.0

MMBIO 466 - Virology Laboratory 1.0

MMBIO 467 - Immunology Lab 1.0

MMBIO 368 - Genomics 3.0

MMBIO 471 - Applied Microbiology 2.0

MMBIO 490R - Molecular Biology Seminar - *You may take once* 1.0

MMBIO 493R - Curr and Instruct Practicum - *You may take up to 2.0 credit hours* 2.0

MMBIO 494R - Advanced Mentored Research - *You may take up to 2.0 credit hours* 0.5v

MMBIO 510 - Hist & Philos Micro & Mol Biol 2.0

MMBIO 512 - Gene Regulation 2.0

MMBIO 514 - Advanced Immunology 2.0

MMBIO 516 - Bacteria-Host Interactions 2.0

MMBIO 518 - Select Pathogens 2.0

MMBIO 520 - Molecular Virology 2.0

MMBIO 522 - Flow Cytometry 2.0

MMBIO 528R - Current Topics in Pathogenesis - *You may take once* 1.0

NDFS 361 - Food Microbiology 3.0

NDFS 544 - Food Fermentations 2.0

PHSCS 106 - General Physics 2 3.0

PWS 340 - Genetics 3.0

PWS 365 - Biogeochem 3.0

PWS 470 - Genomic Analysis 3.0

PWS 514 - Soil Microbiology 2.0

Option 7.2 — Complete up to 4 hours

CELL 210 - Human Anatomy (w/ virtual lab) 3.0

CELL 220 - Human Anatomy (with lab) 4.0

Requirement 8 — Complete 1 Course

MMBIO 498 - Reflections on Learning 0.0

THE DISCIPLINE:

Microbiology applies the tools of chemistry, molecular biology, mathematics, and physics to the study of the structure, biochemistry, genetics, immunology, physiology, and ecology of microorganisms (bacteria, viruses, fungi, protozoa).

This is an excellent degree for majors who desire an advanced degree in microbiology, virology, immunology, parasitology, cell biology, or epidemiology (master's or doctorate).

CAREERS:

Environmental microbiologists are concerned with microorganisms that cause pollution as well as those that can degrade pollutants in bioremediation processes.

Microbial ecologists work on land and in water studying how microbes recycle dead plants and animals and how they can be used to maintain environmental quality or correct environmental mishaps.

Industrial microbiologists fit into many categories. Food microbiologists seek better strains of organisms used to make products; some microbiologists work in pharmaceutical plants, in antibiotic development; others work on the production of solvents and other products from waste material.

Microbial geneticists and biotechnologists study microbial gene function, improve desirable microbial qualities and increase understanding of cell-regulation processes.

Microbial physiologists and biochemists study life processes that employ microbial systems and conduct basic research on microbial growth and development.

Clinical microbiologists are involved in diagnosis and identification of microbial infections and approaches to treatment.

Medical microbiologists study the biology of bacterial pathogens and the mechanisms they use to cause disease.

Virologists study the biology of viruses, the etiology and mechanisms of viral infections and diseases in biological species, and the use of viruses as molecular and biological tools.

Immunologists study the molecular and cellular biology of the immune system and its interactions with microorganisms.

Parasitologists study the biology, etiology, and epidemiology of parasites and the mechanisms by which they interact with their hosts.

Cell biologists study the molecular biology, signal transduction and cell signaling pathways involved in all aspects of biological function. This includes studies at the molecular level of diseases such as heart disease, cancer, diabetes, and AIDS, etc.

Epidemiologists study disease epidemics with an effort to track down the method and cause of the disease.

See faculty advisor for additional career choices.

RESEARCH OPPORTUNITIES:

Students are encouraged to participate in laboratory research. Faculty-directed research programs are available to undergraduates throughout the year.

FINANCING:

Students may be employed either as research or teaching assistants. Several endowed scholarships are available.

PROGRAM OBJECTIVES:

The objectives of the microbiology major program are to provide a conceptual knowledge base and critical thinking skills related to the following areas:

- Microbial cell biology
- Microbial genetics
- Interactions and impact of microorganisms and humans
- Interactions and impact of microorganisms in the environment
- Integrating themes (microbial evolution and diversity)
- Immunology
- Virology
- Parasitology
- Epidemiology
- Cell Biology

MAP DISCLAIMER

While every reasonable effort is made to ensure accuracy, there are some student populations that could have exceptions to listed requirements. Please refer to the university catalog and your college advisement center/department for complete guidelines.

DEPARTMENT INFORMATION

Microbiology and Molecular Biology
Brigham Young University
4007 Life Sciences Building Provo, UT 84602
Telephone: (801) 422-2889

ADVISEMENT CENTER INFORMATION

Life Sciences Advisement
Brigham Young University
2060 Life Sciences Building Provo, UT 84602
Telephone: (801) 422-3042
lifesciences@byu.edu