MICROBIOLOGY MAJOR (B.S.)

Description

The B.S. in Microbiology program provides a comprehensive scientific education in the study of microorganism. Students will explore the diversity microorganisms, along with their genetics, physiology, and interactions with humans and animals, and the environment. The curriculum is rich with hands-on laboratory experiences, and covers topics such as bacterial pathogenesis, microbial ecology, molecular biology, immunology and virology. Graduates are well prepared for careers in biotechnology, public health, healthcare, food safety, and biological research, as well as for advanced degrees in the biological sciences, medicine and other allied health fields.

Requirements

Degree Requirements

Minimum Credit Requirement: 128 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.
**Major GPA requirements as indicated.*

Major Requirements

Code	Title	Credits
Required Courses		
Foundation Courses		
CHEM 403	General Chemistry I	4
CHEM 404	General Chemistry II	4
CHEM 545 & CHEM 546	Organic Chemistry and Organic Chemistry Laboratory	5
MATH 424B	Calculus for Life Sciences	4
PHYS 401	Introduction to Physics I	4
PHYS 402	Introduction to Physics II	4
Bioscience Core Courses		
BIOL 411	Introductory Biology: Molecular and Cellular	4
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
BIOL 528	Applied Biostatistics I	4
BMCB 605	Principles of Cell Biology	4
BMCB 658 & BMCB 659	General Biochemistry and General Biochemistry Lab	5
GEN 604	Principles of Genetics	4
Microbiology Core Courses		
MCBS 401	Professional Perspectives in Molecular, Cellular, and Biomedical Sciences	1
BMS 503 & BMS 504	General Microbiology and General Microbiology Laboratory	5
BMS 602 & BMS 603	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	5
BMS 616	Microbial Ecology	3
Major Electives		
Select six major electives from the below list of courses. [1]		
Three electives must include a laboratory (L).		
Three electives must be at the 700-level.		
BMS 623	Histology: Microscopic Cellular Structure and Function	4
BMS 650	Molecular Diagnostics	4
BMS 655	Human and Animal Parasites	3
BMS 703	Infectious Disease and Health	4
BMS 704	Pathologic Basis of Disease	4
BMS 705 & BMS 715	Immunology and Immunology Laboratory (L)	5
BMS 706 & BMS 708	Virology and Virology Laboratory (L)	5
BMS 719	Host-Microbe Interactions (C)	4
BMS 720	Mycology, Parasitology, and Virology	3
BMS 725	Cell Phenotyping and Tissue Engineering Laboratory (C, L)	4
BMS 730	Ethical Issues in Biomedical Science (C)	4
BMS 735	Molecular and Cellular Parasitology (C)	4
BMS 740	Human Microbiome (C, L)	4
BMCB 754	Molecular Biology Research Methods (C, L)	4
BMCB 763	Biochemistry of Cancer	4
GEN 704	Microbial Genetics and Genomics (C, L)	5
GEN 705	Population Genetics	3
GEN 711	Genomics and Bioinformatics	4
GEN 713	Microbial Ecology and Evolution (C)	4
GEN 717	Molecular Microbiology (C, L)	5
GEN 721	Comparative Genomics	4
ANTH 685	Gender, Sexuality and HIV/AIDS in Africa	4
BIOL 510	Mushrooms, Molds, and Mildews: Introduction to the Fungal Kingdom	4
BIOL 633	Data Analysis for Life Science	4
BIOL 704	Plant-Microbe Interactions	3
BIOL 706	Data Science with R for the Life Sciences	4
CEE 724	Environmental Engineering Microbiology (C, L)	4
HMP 501	Epidemiology and Community Medicine	4
MEFB 506	Marine Parasitology and Disease (Shoals Lab)	4
MEFB 717	Lake Ecology	4
MEFB 755	Biological Oceanography	3
NR 641	Wildlife Disease Ecology	4
NR 706	Soil Ecology (C, L)	4
NR 782	Forest Health in a Changing World	4
SOC 635W	Medical Sociology	4

[1] Undergraduate laboratory research taken for 4 credits as BMS 795 Investigations in Biomedical Science, BMS 795W Investigations in Biomedical Science, BMS 799 Senior Thesis, BMS 799H Senior Honors Thesis, INCO 790 Advanced Research Experience or equivalent, may count towards 1 major elective with lab requirements. Students should discuss the experience with their academic advisor to ensure it is appropriate.

Degree Plan

Sample Degree Plan

This sample degree plan serves as a general guide; students collaborate with their academic advisor to develop a personalized degree plan to meet their academic goals and program requirements.

First Year		
Fall		**Credits**
MCBS 401	Professional Perspectives in Molecular, Cellular, and Biomedical Sciences	1
BIOL 411	Introductory Biology: Molecular and Cellular	4
ENGL 401	First-Year Writing [1]	4
CHEM 403	General Chemistry I	4
Discovery Course		4
	Credits	**17**

Spring		
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
MATH 424B	Calculus for Life Sciences	4
CHEM 404	General Chemistry II	4
Discovery Course		4
	Credits	**16**
Second Year		
Fall		
BMS 503 & BMS 504	General Microbiology and General Microbiology Laboratory	5
GEN 604	Principles of Genetics	4
CHEM 545 & CHEM 546	Organic Chemistry and Organic Chemistry Laboratory [2]	5
Discovery Course		4
	Credits	**18**
Spring		
BMS 602 & BMS 603	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	5
BMS 616	Microbial Ecology	3
BIOL 528	Applied Biostatistics I	4
Discovery Course		4
	Credits	**16**
Third Year		
Fall		
BMCB 605	Principles of Cell Biology	4
PHYS 401	Introduction to Physics I	4
BMCB 658 & BMCB 659	General Biochemistry and General Biochemistry Lab	5
Discovery Course		4
	Credits	**17**
Spring		
PHYS 402	Introduction to Physics II	4
Major Elective		3-4
Major Elective		3-4
Discovery Course		4
	Credits	**14-16**
Fourth Year		
Fall		
Major Elective/Capstone		3-4
Major Elective		3-4
General Elective		4
General Elective		4
	Credits	**14-16**
Spring		
Major Elective		3-4
Major Elective		3-4
General Elective		4
General Elective		4
	Credits	**14-16**
	Total Credits	**126-132**

1 Students applying to health profession schools need a full year of English. ENGL 415C, ENGL 419, ENGL 501, ENGL 502, or ENGL 503 is suggested in addition to ENGL 401. The second course may be taken any semester.

2 Students applying to health profession schools need a full year of Organic Chemistry CHEM 651/CHEM 653 and CHEM 652/CHEM 654 should be taken in place of CHEM 545/CHEM 546.

Student Learning Outcomes

Program Learning Outcomes

Critical Thinking & Problem Solving

- Apply the scientific method to form hypotheses, examine experimental evidence, and draw informed conclusions.
- Apply core knowledge and statistical methods to critically interpret scientific data, and troubleshoot unexpected outcomes.

Quantitative Literacy, Inquiry & Analysis

- Utilize graphs, charts, and tables to represent scientific data.

Oral & Written Communication

- Demonstrate proficiency in the written, oral, and visual communication skills required to convey scientific information.

Core Knowledge in Microbiology

- Compare and contrast cellular and non-cellular microorganisms.
- Explain the basic structure-function relationships of microorganism components, and how specific microbial components contribute to a microorganism's growth and survival.
- Describe how genetic information is maintained and transferred, how mutation can affect viability and contribute to evolution, and how gene expression is regulated.
- Detail how microorganisms interact and influence each other, other organisms, and their environment.
- Understand the principles of microbial pathogenesis and the immune response to infection.
- Analyze and evaluate the complex interactions between microbial communities and their hosts by applying the principles of microbial pathogenesis and microbial ecology.