BS in Microbiology (285120) MAP Sheet
Life Sciences, Microbiology and Molecular Biology
For students entering the degree program during the 2022-2023 curricular year.

University Core and Graduation Requirements
University Core Requirements:
Requirements #Classes Hours Classes
Religion Cornerstones
Teachings and Doctrine of The Book of Mormon 12.0 REL A 275
Jesus Christ and the Everlasting Gospel 12.0 REL A 250
Foundations of the Restoration 12.0 REL C 225
The Eternal Family 12.0 REL C 200
The Individual and Society
American Heritage 1-23.0 6.0 from approved list
Global and Cultural Awareness 13.0 from approved list
Skills
First Year Writing 13.0 from approved list
Advanced Written and Oral Communications 13.0 WRTG 316 recommended
Quantitative Reasoning 13-4.0 STAT 121*, MATH 112*, or MATH 119*
Languages of Learning (Math or Language) 13-4.0 STAT 121*, MATH 112*, or MATH 119*
Arts, Letters, and Sciences
Civilization 113.0 from approved list
Civilization 213.0 from approved list
Arts 13.0 from approved list
Letters 13.0 from approved list
Biological Science 13-4.0 BIO 130*, PDBIO 120*, or MMBIO 121*
Physical Science 1-23.0-7.0 CHEM 105* and PHSCS 105*
Social Science 13.0 from approved list
Core Enrichment: Electives
Religion Electives 3-46.0 from approved list
Open Electives Variable Variable personal choice
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS
(14-15 hours overlap)
Graduation Requirements:
Minimum residence hours required 30.0
Minimum hours needed to graduate 120.0
Suggested Sequence of Courses
Freshman Year
1st Semester
First-year Writing or American Heritage* 3.0
REL A 2752.0
MMBIO 121 or CELL 120 or BIO 1303.0-4.0
CHEM 1054.0
General Education courses, and/or general electives 3.0
Total Hours 15-16.0
2nd Semester
First-year Writing or American Heritage* 3.0
REL A 2502.0
| Course                        | Credits | Year          | Semester       | Course                        | Credits | Year | Semester | Course                        | Credits | Year | Semester | Course                        | Credits | Year | Semester | Course                        | Credits | Year | Semester | Course                        | Credits | Year | Semester | Course                        | Credits | Year | Semester |
|-------------------------------|---------|---------------|----------------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|-------------------------------|---------|------|----------|
| MMBIO 1514.0                  |         |               |                 | CHEM 1063.0                   |         |      |          | CHEM 1071.0                   |         |      |          | Arts or Letters elective*3.0 |         |      |          | Total Hours                   | 16.0    |      |          | Sophomore Year                | MMBIO 403.0 |      |          | MMBIO 241.0                   | 3.0     |      |          | Total Hours                   | 16.0    |      |          | 3rd Semester                  | REL C 2252.0 |      |          | MMBIO 241.0                   | 3.0     |      |          | Total Hours                   | 15.0    |      |          | 4th Semester                  | REL C 2002.0 |      |          | MMBIO 2613.0                  | 3.0     |      |          | Total Hours                   | 14-15.0 |      |          | Junior Year                   | REL C 2002.0 |      |          | Major elective (Requirement 7) | 3.0     |      |          | 5th Semester                  | REL C 2002.0 |      |          | Requirement 3 choice          | 3.0-4.0  |      |          | Total Hours                   | 14-17.0 |      |          | 6th Semester                  | REL C 2002.0 |      |          | Requirement 3 choice          | 3.0-4.0  |      |          | Total Hours                   | 14-15.0 |      |          | Senior Year                   | REL C 2002.0 |      |          | Major elective (Requirement 7) | 3.0     |      |          | 7th Semester                  | REL C 2002.0 |      |          | Requirement 3 choice          | 3.0-4.0  |      |          | Total Hours                   | 13-15.0 |      |          | 8th Semester                  | REL C 2002.0 |      |          | Requirement 3 choice          | 3.0     |      |          | Global and Cultural Awareness* | 3.0     |      |          | Total Hours                   | 14.0    |      |          | quantitative reasoning can be fulfilled by ACT Math subscore of 22 or higher. |
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.

*Double counting options available for some GE courses

**BS in Microbiology (285120)2022-2023 Program Requirements (57 - 60 Credit Hours)**

**requirement 1**
- Complete 1 course
  - BIO 130 - Biology 4.0
  - CELL 120 - Science of Biology 3.0
  - MMBIO 121 - General Biology: Health and Disease 3.0

**requirement 2**
- Complete 4 courses
  - MMBIO 151 - Introduction to Microbiology 4.0
  - MMBIO 240 - Molecular Biology 3.0
  - MMBIO 241 - Molecular and Cellular Biology Laboratory 1.0
  - MMBIO 261 - Infection and Immunity 3.0

**requirement 3**
- Complete 12.0 hours from the following course(s)
  - MMBIO 360 - Bacterial Genetics 4.0
  - MMBIO 363 - Microbial Ecology 2.0
  - MMBIO 364 - Bacterial Pathogenesis 3.0
  - MMBIO 365 - Bacterial Pathogenesis Laboratory 1.0
  - MMBIO 366 - Microbial Ecology Laboratory 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 - General College Chemistry 1 with Lab (Integrated) 4.0
  - CHEM 106 - General College Chemistry 2 3.0
  - PHSCS 105 - General Physics 1 3.0

**requirement 5**
- Complete 1 course
  - CHEM 285 - Introductory Bio-organic Chemistry 4.0
  - CHEM 351 - Organic Chemistry 1 3.0

**requirement 6**
- Complete 1 course
  - *MATH 112 - Calculus 1 4.0
  - MATH 119 - Introduction to Calculus 4.0
  - *STAT 121 - Principles of Statistics 3.0

**requirement 7**
- Complete 14.0 hours from the following option(s)
  - 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 up to 14.0 hours from the following course(s)
    - BIO 165 - Introduction to Bioinformatics 3.0
    - BIO 250 - Evolutionary Medicine 2.0
    - 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 - Advanced Physiology Laboratory 1.0
CHEM 351 - Organic Chemistry 1 3.0
CHEM 352 - Organic Chemistry 2 3.0
CHEM 353 - Organic Chemistry Laboratory--Nonmajors 2.0v
CHEM 481 - Biochemistry 3.0
CHEM 482 - Mechanisms of Molecular Biology 3.0
MMBIO 110R - Extremophiles: Life in Extreme Environments 1.0
MMBIO 122 - General Biology: Health and Disease Laboratory 1.0
MMBIO 162R - Careers in Biomedical Sciences 1.0
MMBIO 194 - Phage Hunters: Discovery 3.0
MMBIO 195 - Phage Hunters: Comparative Genomics 3.0
MMBIO 294R - Mentored Research 3.0v
You may take up to 2 credit hours.
MMBIO 350 - Genetic Counseling 3.0
MMBIO 360 - Bacterial Genetics 4.0
MMBIO 364 - Bacterial Pathogenesis 3.0
MMBIO 365 - Bacterial Pathogenesis Laboratory 1.0
MMBIO 366 - Microbial Ecology Laboratory 1.0
MMBIO 390R - Readings in Molecular Biology 1.0
You may take up to 1 credit hour.
MMBIO 399R - Academic Internship 9.0v
You may take up to 4 credit hours.
MMBIO 409 - Hematology 3.0
MMBIO 411 - Molecular Diagnostics 3.0
MMBIO 441 - Advanced Molecular Biology 3.0
MMBIO 442 - Advanced Molecular Biology Laboratory 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 468 - (MMBio-Bio-PWS) Genomics 3.0
MMBIO 471 - Applied and Industrial Microbiology 2.0
MMBIO 490R - Molecular Biology Seminar 1.0
You may take this course up to 1 time.
MMBIO 493R - Curriculum and Instruction Practicum 2.0
You may take up to 2 credit hours.
MMBIO 494R - Advanced Mentored Research 3.0v
You may take up to 2 credit hours.
MMBIO 510 - History and Philosophy of Microbiology and Molecular Biology 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 1.0
You may take this course up to 1 time.
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 - Biogeochemistry 3.0
PWS 470 - Analysis of Genetic and Genomic Data 3.0
option 7.2 Complete up to 4.0 hours from the following course(s)
CELL 210 - Human Anatomy (with 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:
BS in Microbiology (285120)2022-2023
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.

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