### University Core Requirements:

**Requirements**  | **#Classes** | **Hours** | **Classes**
--- | --- | --- | ---
**Religion Cornerstones**  |  |  |  
Teachings and Doctrine of The Book of Mormon  | 1 | 2.0 | REL A 275
Jesus Christ and the Everlasting Gospel  | 1 | 2.0 | REL A 250
Foundations of the Restoration  | 1 | 2.0 | REL C 225
The Eternal Family  | 1 | 2.0 | REL C 200
**The Individual and Society**  |  |  |  
American Heritage  | 1-2 | 3-6.0 | from approved list
Global and Cultural Awareness  | 1 | 3.0 | from approved list
**Skills**  |  |  |  
First Year Writing  | 1 | 3.0 | from approved list
Advanced Written and Oral Communications  | 1 | 3.0 | WRTG 316 recommended
Quantitative Reasoning  | 1 | 3.0 | STAT 121*, MATH 112*, or MATH 119*
Languages of Learning (Math or Language)  | 1 | 3.0 | STAT 121*, MATH 112*, or MATH 119*
**Arts, Letters, and Sciences**  |  |  |  
Civilization 1  | 1 | 3.0 | from approved list
Civilization 2  | 1 | 3.0 | from approved list
Arts  | 1 | 3.0 | from approved list
Letters  | 1 | 3.0 | from approved list
Biological Science  | 1 | 3.0 | BIO 130*, PDBIO 120*, or MMBIO 121*
Physical Science  | 1-2 | 3.0 | CHEM 105* and PHSCS 105*
Social Science  | 1 | 3.0 | from approved list
**Core Enrichment: Electives**  |  |  |  
Religion Electives  | 3-4 | 6.0 | 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

<table>
<thead>
<tr>
<th>Semester</th>
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<tbody>
<tr>
<td>1st Semester</td>
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<tr>
<td>2nd Semester</td>
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#### SOPHOMORE YEAR

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<tr>
<td>4th Semester</td>
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#### JUNIOR YEAR

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<td>5th Semester</td>
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#### SENIOR YEAR

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<td>16-17.0</td>
</tr>
<tr>
<td>7th Semester</td>
<td>13-15.0</td>
</tr>
</tbody>
</table>

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

+ Quantitative Reasoning can be fulfilled by ACT Math subscore of 22 or higher.
### REQUIREMENT 1
Complete 1 course

- **BIO 130** - Biology 4.0
- **MBIO 121** - General Biology: Health and Disease 3.0
- **PDBIO 120** - Science of Biology 3.0

### REQUIREMENT 2
Complete 4 courses

- **MBIO 151** - Introduction to Microbiology 4.0
- **MBIO 240** - Molecular Biology 3.0
- **MBIO 241** - Molecular and Cellular Biology Laboratory 1.0
- **MBIO 261** - Infection and Immunity 3.0

### REQUIREMENT 3
Complete 1 option

**OPTION 3.1** Complete 1 course

- **MBIO 360** - Microbial Genetics 4.0
- **MBIO 461** - Advanced Bacterial Physiology 3.0

**OPTION 3.2** Complete 2 courses

- **MBIO 363** - Microbial Ecology 2.0
- **MBIO 366** - Microbial Ecology Laboratory 1.0

### REQUIREMENT 4
Complete 2 courses

**COMPLETE TWO OR MORE COURSES FROM THE FOLLOWING (NOTE: THE COURSE TAKEN ABOVE WILL NOT DOUBLE COUNT FOR THIS REQUIREMENT):**

- **MBIO 360** - Microbial Genetics 4.0
- **MBIO 363** - Microbial Ecology 2.0
- **MBIO 364** - Bacterial Pathogenesis 3.0
- **MBIO 418** - Medical Parasitology 2.0
- **MBIO 461** - Advanced Bacterial Physiology 3.0
- **MBIO 463** - Immunology 3.0
- **MBIO 465** - Virology 3.0

*Note: it is recommended students take any courses not used to fill this requirement as electives.

### REQUIREMENT 5
Complete 4 courses

**PHYSICAL SCIENCE COURSES:**

- **CHEM 105** - General College Chemistry 1 with Lab (Integrated) 4.0
- **CHEM 106** - General College Chemistry 2 3.0
- **CHEM 107** - General College Chemistry Laboratory 1.0
- **PHSCS 105** - General Physics 1 3.0

### REQUIREMENT 6
Complete 1 course

**FOR SOME MEDICAL SCHOOLS AND SOME GRADUATE SCHOOLS, CHEM 351, 352, 353, AND 481 ARE REQUIRED CLASSES. THESE CLASSES MAY BE USED AS ELECTIVES FOR THE MICROBIOLOGY DEGREE PROGRAM (SEE BELOW): IF CHEM 285 IS USED TO FULFILL REQUIREMENT 6, CHEM 351 MAY BE USED AS AN ELECTIVE FOR REQUIREMENT 8. CHEM 351 WILL NOT DOUBLE COUNT BETWEEN REQUIREMENTS 6 AND 8.**

- **CHEM 285** - Introductory Bio-organic Chemistry 4.0
- **CHEM 351** - Organic Chemistry 1 3.0

### REQUIREMENT 7
Complete 1 option

**OPTION 7.1** Complete 1 course

**QUANTITATIVE COURSES:**

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

*Note: Math 119 is offered through BYU Independent Study.

### REQUIREMENT 8
Complete 14.0 hours from the following option(s)

**OPTION 8.1** Complete up to 14.0 hours from the following course(s)

- **CHEM 105** - General College Chemistry 2 3.0
- **CHEM 106** - General College Chemistry 1 with Lab (Integrated) 4.0
- **CHEM 107** - General College Chemistry 2 4.0
- **CHEM 481** - Biochemistry 3.0
- **CHEM 482** - Mechanisms of Molecular Biology 3.0
- **MBIO 110R** - Extremophiles: Life in Extreme Environments 1.0
- **MBIO 122** - General Biology: Health and Disease Laboratory 1.0
- **MBIO 162R** - Careers in Biomedical Sciences 1.0
- **MBIO 185R** - Molecular Biology and Evolution 1.0
- **MBIO 261** - Infection and Immunity 3.0
- **MBIO 360** - Microbial Genetics 3.0
- **MBIO 363** - Medical Parasitology 3.0
- **MBIO 364** - Bacterial Pathogenesis Laboratory 1.0
- **MBIO 399R** - Academic Internship 9.0
- **MBIO 411** - Molecular Diagnostics 3.0
- **MBIO 441** - Advanced Molecular Biology 3.0
- **MBIO 442** - Advanced Molecular Biology Laboratory 1.0
- **MBIO 466** - Virology Laboratory 1.0
- **MBIO 467** - Immunology Lab 1.0
- **MBIO 468** - (MBIO-Bio-PWS) Genomics 3.0
- **MBIO 471** - Applied and Industrial Microbiology 2.0
- **MBIO 491R** - Curriculum and Instruction Practicum 2.0
- **MBIO 510** - History and Philosophy of Microbiology and Molecular Bio (Nonmajors) 2.0
- **MBIO 512** - Gene Regulation 2.0
- **MBIO 514** - Advanced Immunology 2.0
- **MBIO 516** - Bacteria-Host Interactions 2.0
- **MBIO 518** - Select Pathogens 2.0
- **MBIO 520** - Molecular Virology 2.0
- **MBIO 521** - Flow Cytometry 2.0
- **MBIO 528R** - Current Topics in Pathogenesis 1.0
- **PDBIO 325** - Microbial Ecology 2.0
- **PDBIO 337** - Microbial Genetics 3.0
- **PDBIO 361** - Microbial Pathogenesis 2.0
- **PDBIO 366** - Advanced Bacterial Physiology 2.0
- **PDBIO 399R** - Academic Internship 9.0
- **PDBIO 411** - Molecular Diagnostics 3.0
- **PDBIO 441** - Advanced Molecular Biology 3.0
- **PDBIO 442** - Advanced Molecular Biology Laboratory 1.0
- **PDBIO 466** - Virology Laboratory 1.0
- **PDBIO 467** - Immunology Lab 1.0
- **PDBIO 468** - (MBIO-Bio-PWS) Genomics 3.0
- **PDBIO 471** - Applied and Industrial Microbiology 2.0
- **PDBIO 491R** - Curriculum and Instruction Practicum 2.0
- **PDBIO 510** - History and Philosophy of Microbiology and Molecular Bio (Nonmajors) 2.0
- **PDBIO 512** - Gene Regulation 2.0
- **PDBIO 514** - Advanced Immunology 2.0
- **PDBIO 516** - Bacteria-Host Interactions 2.0
- **PDBIO 518** - Select Pathogens 2.0
- **PDBIO 520** - Molecular Virology 2.0
- **PDBIO 521** - Flow Cytometry 2.0
- **PDBIO 528R** - Current Topics in Pathogenesis 1.0

### OPTION 8.2
Complete up to 6.0 hours from the following course(s)

**NOTE: ONLY 3 TOTAL CREDITS OF MBIO/BIO 194, 195, 399R, AND 494R WILL COUNT TOWARD MAJOR HOURS WITH A 4 CREDIT HOUR MAXIMUM FOR EACH INDIVIDUAL COURSE. (MORE CREDIT HOURS MAY BE TAKEN BUT THEY WILL NOT COUNT TOWARDS MAJOR REQUIREMENTS.)**

- **MBIO 194** - Phage Hunters: Discovery 3.0
- **MBIO 195** - Phage Hunters: Comparative Genomics 3.0
- **MBIO 294R** - Mentored Research 3.0
- **MBIO 399R** - Advanced Internship 3.0
- **MBIO 494R** - Advanced Mentored Research 3.0

### OPTION 8.3
Complete up to 14.0 hours from the following course(s)

**COURSES NOT CHOSEN PREVIOUSLY IN REQUIREMENT 3 ABOVE:**

- **CHEM 223** - General Biology: Health and Disease Laboratory 1.0
- **CHEM 285** - Introductory Bio-organic Chemistry 4.0
- **CHEM 351** - Organic Chemistry 1 3.0
- **PHYS 104** - General Physics 1 3.0
- **PHYS 106** - General Physics Lab 1 1.0
- **PHYS 108** - General Physics Lab 2 1.0
- **WRTG 316** - Technical Communication 3.0

### REQUIREMENT 9
Successfully pass the Biology Major Field Exam.

### REQUIREMENT 10
Complete an exit interview.

**RECOMMENDED** Complete 4 courses

**ALTHOUGH NOT REQUIRED, THESE COURSES ARE RECOMMENDED:**

- **CHEM 223** - General Biology: Health and Disease Laboratory 1.0
- **CHEM 285** - Introductory Bio-organic Chemistry 4.0
- **CHEM 351** - Organic Chemistry 1 3.0
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

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