### University Core Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion Cornerstones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachings and Doctrine of The Book of Mormon</td>
<td>1</td>
<td>2.0</td>
<td>REL A 275</td>
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<tr>
<td>Jesus Christ and the Everlasting Gospel</td>
<td>1</td>
<td>2.0</td>
<td>REL A 250</td>
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<tr>
<td>Foundations of the Restoration</td>
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<td>REL C 225</td>
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<tr>
<td>The Eternal Family</td>
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<td>REL C 200</td>
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<tr>
<td>The Individual and Society</td>
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<tr>
<td>American Heritage</td>
<td>1-2</td>
<td>3-6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Global and Cultural Awareness</td>
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<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Skills</td>
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<tr>
<td>First Year Writing</td>
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<tr>
<td>Advanced Written and Oral Communications</td>
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<td>3.0</td>
<td>WRTG 316</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
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<td>3-4.0</td>
<td>STAT 121*, MATH 112*, or MATH 119*</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
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<td>3-4.0</td>
<td>STAT 121*, MATH 112*, or MATH 119*</td>
</tr>
<tr>
<td>Arts, Letters, and Sciences</td>
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<tr>
<td>Civilization 1</td>
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<tr>
<td>Civilization 2</td>
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<tr>
<td>Arts</td>
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<tr>
<td>Letters</td>
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<tr>
<td>Biological Science</td>
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<td>BIO 130*, PDBIO 120*, or MMBIO 121*</td>
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<tr>
<td>Physical Science</td>
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<td>3.0-7.0</td>
<td>CHEM 105* and PHSCS 105*</td>
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<tr>
<td>Social Science</td>
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<td>from approved list</td>
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<tr>
<td>Core Enrichment: Electives</td>
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<tr>
<td>Religion Electives</td>
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<td>6.0</td>
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</tr>
<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
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</tbody>
</table>

*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 275 2.0
- MMBIO 122 or PDBIO 120 or BIO 130 3.0
- CHEM 105 4.0
- 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 250 2.0
- MMBIO 151 4.0
- CHEM 106 3.0
- CHEM 107 1.0
- Arts or Letters elective* 3.0

**Total Hours**: 16.0

**SOPHOMORE YEAR**

**3rd Semester**
- REL C 225 2.0
- MMBIO 240 3.0
- MBBIO 241 1.0
- PHSCS 105 3.0
- Civilization 1 elective 3.0
- Social Science elective* 3.0

**Total Hours**: 15.0

**4th Semester**
- REL C 200 2.0
- MMBIO 261 3.0
- Major elective 3.0
- Civilization 2 elective* 3.0
- Languages of Learning (Math or language) 3.0

**Total Hours**: 14-15.0

*Quantitative Reasoning can be fulfilled by ACT Math subscore of 22 or higher.

**JUNIOR YEAR**

**5th Semester**
- Religion elective* 2.0
- CHEM 351 or CHEM 285 3.0
- Quantitative Reasoning choice 3.0
- MMBIO 360, 363, or 461 (Option 3.1) 3.0
- Major elective 3.0

**Total Hours**: 14-17.0

**6th Semester**
- Religion elective* 2.0
- Option 3.2 choice 3.0
- Major electives 8.0
- General elective 3.0

**Total Hours**: 16-17.0

**SENIOR YEAR**

**7th Semester**
- Religion elective* 2.0
- Major elective 3.0
- Option 3.2 choice 2.4
- Adv. Written & Oral Communication 3.0
- Arts or Letters elective 3.0

**Total Hours**: 13-15.0

**8th Semester**
- Open electives 8.0
- Global and Cultural Awareness* 3.0
- Major electives 3.0

**Total Hours**: 14.0

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.

*Double counting options available for some GE courses
### REQUIREMENT 1
Complete 1 course
- MMBIO 121 - General Biology: Health and Disease
- MMBIO 122 - General Biology: Health and Disease Laboratory
- MMBIO 230 - Medical Microbiology

### REQUIREMENT 2
Complete 4 courses
- MMBIO 151 - Introduction to Microbiology
- MMBIO 240 - Molecular Biology
- MMBIO 241 - Molecular and Cellular Biology Laboratory
- MMBIO 261 - Infection and Immunity

### REQUIREMENT 3
Complete 1 option
- MMBIO 363 - Microbial Ecology
- MMBIO 366 - Microbial Ecology Laboratory

### REQUIREMENT 4
Complete 2 courses
- MMBIO 351 - Human Anatomy (with lab)
- MMBIO 353 - Human Physiology
- MMBIO 355 - Tissue Biology (with lab)
- MMBIO 360 - Cell Biology
- MMBIO 362 - Advanced Physiology
- MMBIO 363 - Advanced Physiology Laboratory
- PHYSICS 106 - General Physics 2
- PHYSICS 340 - Genetics
- PHYSICS 365 - Environmental Microbiology and Biogeochemistry
- PHYSICS 514 - Soil Microbiology

### REQUIREMENT 5
Complete 1 option

#### OPTION 3.1
Complete 1 course
- MMBIO 361 - Introductory Bio-organic Chemistry
- CHEM 105 - General College Chemistry
- CHEM 106 - General College Chemistry 1 with Lab (Integrated)
- CHEM 107 - General College Chemistry Laboratory

#### OPTION 3.2
Complete 2 courses
- MMBIO 364 - Bacterial Pathogenesis
- MMBIO 411 - Molecular Biology
- MMBIO 409 - Hematology
- MMBIO 411 - Molecular Diagnostics

#### OPTION 3.3
Complete 4 courses
- MMBIO 365 - Genetic Counseling
- MMBIO 366 - Bacterial Pathogenesis Laboratory
- MMBIO 399R - Academic Internship
- MMBIO 409R - Advanced Mentored Research

### REQUIREMENT 6
Complete 1 course
- CHEM 107 - General College Chemistry Laboratory
- CHEM 241 - Physical Science Courses
- CHEM 285 - Introductory Bio-organic Chemistry
- CHEM 351 - Organic Chemistry 1

### REQUIREMENT 7
Complete 1 option

#### OPTION 7.1
Complete 1 course
- CHEM 119 - Introduction to Calculus
- STAT 111 - Principles of Statistics

#### OPTION 7.2
Complete 4 courses
- CHEM 119 - Introduction to Calculus
- STAT 111 - Principles of Statistics
- MATH 119 - Calculus 1

### 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 285 - Introductory Bio-organic Chemistry
- CHEM 107 - General College Chemistry
- CHEM 106 - General College Chemistry 1 with Lab (Integrated)
- PHYSICS 105 - General College Chemistry Laboratory

#### OPTION 8.2
Complete up to 6.0 hours from the following course(s)
- MMBIO 122 - General Biology: Health and Disease Laboratory
- MMBIO 160R - Careers in Biomedical Sciences
- MMBIO 350 - Genetic Counseling
- MMBIO 365 - Bacterial Pathogenesis Laboratory
- MMBIO 390R - Readings in Molecular Biology

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

### REQUIREMENT 10
Complete an exit interview.

#### RECOMMENDED
Complete 4 courses
- CHEM 223 - General Chemistry 2
- CHEM 224 - General Chemistry 3
- CHEM 225 - General Chemistry 4
- CHEM 226 - General Chemistry 5

### REQUIREMENT 11
Take at least 120 semester hours of college-level courses.

### REQUIREMENT 12
Complete a minimum of 285120 hours of required courses.

### REQUIREMENT 13
Complete a minimum of 53 - 59 credit hours.

### REQUIREMENT 14
Complete a minimum of 285120 hours of required courses.

### REQUIREMENT 15
Complete a minimum of 53 - 59 credit hours.

### REQUIREMENT 16
Complete a minimum of 285120 hours of required courses.

### REQUIREMENT 17
Complete a minimum of 53 - 59 credit hours.
### 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:

- 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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Provo, UT 84602
Telephone: (801) 422-2889

### ADVISEMENT CENTER INFORMATION

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