BS in MICROBIOLOGY (285120) MAP Sheet
Department of Microbiology and Molecular Biology
For students entering the degree program during the 2014–2015 curricular year.

### UNIVERSITY CORE AND GRADUATION REQUIREMENTS

#### UNIVERSITY CORE REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctrinal Foundation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Book of Mormon</td>
<td>2</td>
<td>4.0</td>
<td>Rel A 121 and 122</td>
</tr>
<tr>
<td>New Testament</td>
<td>1</td>
<td>2.0</td>
<td>Rel A 211 or 212</td>
</tr>
<tr>
<td>Doctrine and Covenants</td>
<td>1</td>
<td>2.0</td>
<td>Rel C 324 or 325</td>
</tr>
<tr>
<td>The Individual and Society</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citizenship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Heritage</td>
<td>1–2</td>
<td>3–6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Global &amp; Cultural Awareness</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First-Year Writing</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Adv Written &amp; Oral Communication</td>
<td>1</td>
<td>3.0</td>
<td>Engl 316 recommended</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>0–1</td>
<td>0–4.0</td>
<td>Stat 121*, Math 112*, or Math 119*</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>3–4.0</td>
<td>Stat 121*, Math 112*, or Math 119*</td>
</tr>
<tr>
<td>Arts, Letters, and Sciences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civilization 1 and 2</td>
<td>2</td>
<td>6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Arts</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Letters</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Scientific Principles &amp; Reasoning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Science</td>
<td>1–2</td>
<td>4–5.0</td>
<td>Bio 130*, or MMBio 240* and PDBio 120*</td>
</tr>
<tr>
<td>Physical Science</td>
<td>2</td>
<td>7.0</td>
<td>Chem 105* and Phscs 105*</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Core Enrichment: Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion Electives</td>
<td>3–4</td>
<td>6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
</tr>
</tbody>
</table>

#### PROGRAM REQUIREMENTS (63–67 total hours)

<table>
<thead>
<tr>
<th>Complete one of the following courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio 130* Biology</td>
<td>4.0</td>
</tr>
<tr>
<td>PDBio 120* Science of Biology</td>
<td>2.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete the following biology core courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MMBio 151 Introduction to Microbiology</td>
<td>4.0</td>
</tr>
<tr>
<td>MMBio 240* Molecular Biology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBio 241 Molecular &amp; Cellular Biology Lab</td>
<td>1.0</td>
</tr>
<tr>
<td>MMBio 261 Infection and Immunity</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete four courses from the following (at least two of which must have a lab component+):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MMBio 360+ Microbial Genetics</td>
<td>4.0</td>
</tr>
<tr>
<td>MMBio 363+ Microbial Ecology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBio 364+ Bacterial Pathogenesis</td>
<td>4.0</td>
</tr>
<tr>
<td>MMBio 461 Advanced Bacterial Physiology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBio 463 Immunology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBio 465 Virology</td>
<td>3.0</td>
</tr>
</tbody>
</table>

+Note: For MMBio 360, 363, and 364, lab registration is automatic and included in the course with the lecture. MMBio 463 and 465 can be taken with or without the MMBio 467 or 468 labs, respectively.

<table>
<thead>
<tr>
<th>Complete the following chemistry courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 105* General College Chemistry</td>
<td>4.0</td>
</tr>
<tr>
<td>Chem 106 General College Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>Chem 107 General College Chemistry Lab</td>
<td>1.0</td>
</tr>
<tr>
<td>Chem 351 Organic Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>Chem 352 Organic Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>Chem 353 Organic Chemistry Lab - nonmajors</td>
<td>2.0V</td>
</tr>
<tr>
<td>Chem 481 Biochemistry 1</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete the following:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phscs 105 General Physics 1</td>
<td>3.0</td>
</tr>
<tr>
<td>Phscs 106 General Physics 2</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete one of the following courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 112* Calculus 1</td>
<td>4.0</td>
</tr>
<tr>
<td>Math 119* Introduction to Calculus</td>
<td>4.0</td>
</tr>
<tr>
<td>Stat 121* Principles of Statistics</td>
<td>3.0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Complete at least 10 hours from the following:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio 350 Ecology</td>
<td>3.0</td>
</tr>
<tr>
<td>Bio 420 Evolutionary Biology</td>
<td>3.0</td>
</tr>
<tr>
<td>Bio 421 Evolutionary Biology Laboratory</td>
<td>1.0</td>
</tr>
<tr>
<td>Bio 463 Genetics of Human Disease</td>
<td>3.0</td>
</tr>
</tbody>
</table>

(Continued in next column)
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 EXPERIENCE:**
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

**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 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 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.
- **Medical microbiologists** are involved in the 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.
- **Clinical microbiologists** are involved in the diagnosis and identification of microbial infections and approaches to treatment.
- **Microbial physiologists and biochemists** study life processes that employ microbial systems and conduct basic research on microbial growth and development.
- **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 the 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.