BS in MICROBIOLOGY (285120) MAP Sheet
Department of Microbiology and Molecular Biology
For students entering the degree program during the 2013–2014 curricular year.

<table>
<thead>
<tr>
<th>UNIVERSITY CORE REQUIREMENTS</th>
<th>PROGRAM REQUIREMENTS (62–67 total hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNIVERSITY CORE REQUIREMENTS</strong></td>
<td><strong>Complete one of the following courses:</strong></td>
</tr>
<tr>
<td>Requirements</td>
<td>#Classes</td>
</tr>
<tr>
<td>Docential Foundation</td>
<td>2</td>
</tr>
<tr>
<td>New Testament</td>
<td>1</td>
</tr>
<tr>
<td>Doctrinal and Communants</td>
<td>1</td>
</tr>
<tr>
<td><strong>The Individual and Society</strong></td>
<td><strong>Complete the following biology core courses:</strong></td>
</tr>
<tr>
<td>Citizenship</td>
<td>1–2</td>
</tr>
<tr>
<td>American Heritage</td>
<td>1</td>
</tr>
<tr>
<td>Global &amp; Cultural Awareness</td>
<td>1</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td><strong>Complete four courses from the following (at least two of which must have a lab component):</strong></td>
</tr>
<tr>
<td>Effective Communication</td>
<td>1</td>
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<tr>
<td>First-Year Writing</td>
<td>1</td>
</tr>
<tr>
<td>Adv Written &amp; Oral Communication</td>
<td>0–1</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
<td><strong>Complete the following chemistry courses:</strong></td>
</tr>
<tr>
<td>Civilization 1 and 2</td>
<td>2</td>
</tr>
<tr>
<td>Arts</td>
<td>1</td>
</tr>
<tr>
<td>Letters</td>
<td>1</td>
</tr>
<tr>
<td>Scientific Principles &amp; Reasoning</td>
<td>1–2</td>
</tr>
<tr>
<td>Biological Science</td>
<td>1</td>
</tr>
<tr>
<td>Physical Science</td>
<td>2</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
</tr>
<tr>
<td><strong>Core Enrichment: Electives</strong></td>
<td><strong>Complete the following:</strong></td>
</tr>
<tr>
<td>Religion Electives</td>
<td>3–4</td>
</tr>
<tr>
<td>Open Electives</td>
<td>Variable</td>
</tr>
<tr>
<td><strong>GRADUATION REQUIREMENTS:</strong></td>
<td><strong>Phscs 105 Introductory Applied Physics</strong></td>
</tr>
<tr>
<td>Minimum residence hours required</td>
<td>30.0</td>
</tr>
<tr>
<td>Minimum hours needed to graduate</td>
<td>120.0</td>
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**Note:** For MMBio 360, 363, and 364, labs 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 466 labs, respectively.

**Complete the following chemistry courses:**
- Chem 105* General College Chemistry 4.0
- Chem 106 General College Chemistry 3.0
- Chem 107 General College Chemistry Lab 1.0
- Chem 351 Organic Chemistry 3.0
- Chem 352 Organic Chemistry 3.0
- Chem 353 Organic Chemistry Lab - nonmajors 2.0V (1 hour required)
- Chem 481 Biochemistry 1 3.0

**Complete one of the following:**
- 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.

**Successfully pass the Biology Major Field Exam.**

**Complete an exit interview**

**Recommended Courses:**
- Engl 316, Math 113, Phscs 107, 108.

**FOR UNIVERSITY CORE QUESTIONS CONTACT THE ADVISEMENT CENTER**

**FOR PROGRAM QUESTIONS SEE YOUR FACULTY ADVISOR**

**Note:** These classes fill both university core and program requirements (14–15 hours overlap).
Suggested Sequence of Courses:

**FRESHMAN YEAR**

1st Semester
- First-Year Writing or A Htg 100 3.0
- Rel A 121 2.0
- PDBio 120 or Bio 130 2–4.0
- Chem 105 4.0
- General Elective 3.0

**Total Hours** 14–16.0

2nd Semester
- First-Year Writing or A Htg 100 3.0
- Rel A 122 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 A 211 or 212 2.0
- MMBio 240 3.0
- MMBio 241 1.0
- Phscs 105 (Physical Science elective) 3.0
- Civilization I elective 3.0
- Social Science elective 3.0

**Total Hours** 15.0

4th Semester
- Rel C 324 or 325 2.0
- MMBio 261 3.0
- Phscs 106 (if opted) 3.0
- Civilization 2 elective 3.0
- Stats 121, Math 112 or Math 119 3–4.0

**Total Hours** 14–15.0

**JUNIOR YEAR**

5th Semester
- Religion elective 2.0
- Chem 351 3.0
- Stats 121, Math 112, or Math 119 3–4.0
- MMBio 360-465 choice 4.0
- Micro elective 3.0

**Total Hours** 15–16.0

6th Semester
- Religion elective 2.0
- Chem 352 3.0
- Chem 353 1.0–2.0
- MMBio 360-465 choice 3.0
- Micro elective 3.0
- General elective 3.0

**Total Hours** 15–16.0

**SENIOR YEAR**

7th Semester
- Religion elective 2.0
- Adv. Written & Oral Communication 3.0
- MMBio 360-465 choice 4.0
- Recommended: Enlg 316
- Arts or Letters elective 3.0

**Total Hours** 15.0

8th Semester
- MMBio 360-465 choice 3.0
- Micro elective 4.0
- Global/Cultural Awareness 3.0
- General electives, if needed 2–6.0

**Total Hours** 12–16.0

**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 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

*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.