### 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><strong>Religion Cornerstones</strong></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>
</tr>
<tr>
<td>Jesus Christ and the Everlasting Gospel</td>
<td>1</td>
<td>2.0</td>
<td>REL A 250</td>
</tr>
<tr>
<td>Foundations of the Restoration</td>
<td>1</td>
<td>2.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td>The Eternal Family</td>
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<td>2.0</td>
<td>REL C 200</td>
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<tr>
<td><strong>The Individual and Society</strong></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 and Cultural Awareness</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Skills</strong></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>Advanced Written and Oral Communications</td>
<td>1</td>
<td>3.0</td>
<td>WRTG 316 recommended</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>3-4.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>3-4.0</td>
<td>MATH 112*, 119*, or STAT 121*</td>
</tr>
<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Civilization 1</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization 2</td>
<td>1</td>
<td>3.0</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>
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<tr>
<td>Biological Science</td>
<td>1-2</td>
<td>3-4.0</td>
<td>BIO 130*, PDBIO 120*, or MMBIO 121*</td>
</tr>
<tr>
<td>Physical Science</td>
<td>1</td>
<td>3.0</td>
<td>CHEM 105*, PHSCS 105*</td>
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<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td><strong>Core Enrichment: Electives</strong></td>
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<td></td>
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<tr>
<td>Religion Electives</td>
<td>3-4</td>
<td>6.0</td>
<td>from approved list</td>
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<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
</tr>
</tbody>
</table>

**Note:** Quantitative Reasoning elective fulfilled by Math 112 or Math 119.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graduation Requirements:</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Minimum residence hours required</td>
<td></td>
<td>30.0</td>
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</tr>
<tr>
<td>Minimum hours needed to graduate</td>
<td></td>
<td>120.0</td>
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</tbody>
</table>

#### Suggested Sequence of Courses

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4th Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5th Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6th Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7th Semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8th Semester</td>
<td></td>
</tr>
</tbody>
</table>

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

*Double counting options available for some GE courses.*
### BS in Molecular Biology (285125)
#### 2021-2022 Program Requirements (57 - 60 Credit Hours)

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>REQUIREMENT 1</td>
<td>Complete 1 course</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENT 2</td>
<td>10 courses</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENT 3</td>
<td>Complete 1 course</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENT 4</td>
<td>Complete 4 courses</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENT 5</td>
<td>Complete 1 course</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENT 6</td>
<td>Complete 1 course</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENT 7</td>
<td>Complete 12.0 hours from the following course(s)</td>
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</table>

**Complete 12.0 hours from the following course(s)**

- BIO 110 - Biology 4.0
- BIO 111 - General Biology: Health and Disease 3.0
- MMBIO 121 - General Biology 3.0

**Complete 10 courses**

- BIO 165 - Introduction to Bioinformatics 3.0
- BIO 250 - Evolutionary Medicine 2.0
- CELL 360 - Cell Biology 3.0
- MMBIO 240 - Molecular Biology 3.0
- MMBIO 241 - Molecular and Cellular Biology Laboratory 1.0
- MMBIO 390R - Readings in Molecular Biology 1.0
- MMBIO 441 - Advanced Molecular Biology 3.0
- MMBIO 468 - (MMBio-Bio-PWS) Genomics 3.0
- MMBIO 490R - Molecular Biology Seminar 1.0
- PWS 340 - Genetics 3.0

**Complete 1 course**

- CHEM 105 - General College Chemistry 1 (Integrated) 4.0
- CHEM 106 - General College Chemistry 2 3.0
- CHEM 107 - General College Chemistry Laboratory 1.0
- CHEM 351 - Organic Chemistry 1 3.0
- CHEM 352 - Organic Chemistry 2 3.0
- CHEM 353 - Organic Chemistry Laboratory - Nonmajors 2.0
- CHEM 481 - Biochemistry 3.0
- CHEM 482 - Mechanisms of Molecular Biology 3.0
- MMBIO 109R - Extremophiles: Life in Extreme Environments 1.0
- MMBIO 112 - General Biology: Health and Disease Laboratory 1.0
- MMBIO 151 - Introduction to Microbiology 4.0
- MMBIO 162R - Careers in Biomedical Sciences 1.0
- MMBIO 194 - Phage Hunters: Comparative Genomics 3.0
- MMBIO 261 - Infection and Immunity 3.0
- MMBIO 294R - Mentored Research 3.0
- MMBIO 366 - Microbial Ecology Laboratory 1.0
- MMBIO 399R - Academic Internship 9.0

**Complete 2.0 hours from the following course(s)**

- CHEM 107 - General College Chemistry Laboratory 1.0
- CHEM 285 - Introductory Bio-organic Chemistry 4.0
- CHEM 351 - Organic Chemistry 3.0
- MATH 112 - Calculus I 4.0
- MATH 119 - Introduction to Calculus 4.0
- STAT 121 - Principles of Statistics 3.0

**Complete 1 course**

- BIO 420 - Evolutionary Biology 4.0
- BIO 463 - Genetics of Human Disease 3.0
- BIO 465 - Capstone in Bioinformatics 3.0

**Complete 12.0 hours from the following course(s)**

- BIO 220 - Human Anatomy (with lab) 3.0
- CELL 325 - Tissue Biology (with lab) 3.0
- CELL 362 - Advanced Physiology 3.0
- CELL 363 - Advanced Physiology Laboratory 1.0
- MBBIO 494R - Advanced Mentored Research 3.0

**Complete 10 courses**

- BIO 130 - Genetics 3.0
- CHEM 106 - General College Chemistry 2 3.0
- CHEM 107 - General College Chemistry Laboratory 1.0
- CHEM 285 - Introductory Bio-organic Chemistry 4.0
- CHEM 351 - Organic Chemistry 1 3.0
- CHEM 352 - Organic Chemistry 2 3.0
- CHEM 353 - Organic Chemistry Laboratory - Nonmajors 2.0
- CHEM 481 - Biochemistry 3.0
- CHEM 482 - Mechanisms of Molecular Biology 3.0
- MMBIO 110R - Extremophiles: Life in Extreme Environments 1.0
- MMBIO 112 - General Biology: Health and Disease Laboratory 1.0
- MMBIO 151 - Introduction to Microbiology 4.0
- MMBIO 162R - Careers in Biomedical Sciences 1.0
- MMBIO 194 - Phage Hunters: Comparative Genomics 3.0
- MMBIO 261 - Infection and Immunity 3.0
- MMBIO 294R - Mentored Research 3.0
- MMBIO 366 - Microbial Ecology Laboratory 1.0
- MMBIO 399R - Academic Internship 9.0

**You may take up to 2 credit hours.**

**REQUIREMENT 5**

- MMBIO 467
- MMBIO 466
- MMBIO 465
- MMBIO 461
- MMBIO 411
- MMBIO 409
- MMBIO 366
- MMBIO 365
- MMBIO 364
- MMBIO 363
- MMBIO 360
- MMBIO 350
- MMBIO 294R - Mentored Research
- CHEM 481 - Biochemistry
- CHEM 482 - Mechanisms of Molecular Biology
- CHEM 352 - Organic Chemistry 2
- CHEM 353 - Organic Chemistry Laboratory - Nonmajors
- CHEM 481 - Biochemistry
- CHEM 482 - Mechanisms of Molecular Biology

**REQUIREMENT 6**

- MBBIO 467
- MBBIO 466
- MBBIO 465
- MBBIO 461
- MBBIO 411
- MBBIO 409
- MBBIO 366
- MBBIO 365
- MBBIO 364
- MBBIO 363
- MBBIO 360
- MMBIO 350
- MMBIO 294R - Mentored Research
- CHEM 481 - Biochemistry
- CHEM 482 - Mechanisms of Molecular Biology
- CHEM 352 - Organic Chemistry 2
- CHEM 353 - Organic Chemistry Laboratory - Nonmajors
- CHEM 481 - Biochemistry
- CHEM 482 - Mechanisms of Molecular Biology

**REQUIREMENT 7**

- MBBIO 467
- MBBIO 466
- MBBIO 465
- MBBIO 461
- MBBIO 411
- MBBIO 409
- MBBIO 366
- MBBIO 365
- MBBIO 364
- MBBIO 363
- MBBIO 360
- MMBIO 350
- MMBIO 294R - Mentored Research
- CHEM 481 - Biochemistry
- CHEM 482 - Mechanisms of Molecular Biology
- CHEM 352 - Organic Chemistry 2
- CHEM 353 - Organic Chemistry Laboratory - Nonmajors
- CHEM 481 - Biochemistry
- CHEM 482 - Mechanisms of Molecular Biology

**REQUIREMENT 8**

- MBBIO 522
- MBBIO 520
- MBBIO 521
- MBBIO 528R - Current Topics in Pathogenesis
- PHSCS 106 - General Physics 2
- PWS 470 - Analysis of Genetic and Genomic Data

**REQUIREMENT 9**

- Complete an exit interview.

**THE DISCIPLINE:**

Molecular biology is the basic science that has as its goal an explanation of life processes at the subcellular and molecular level. Recent years have seen explosive advances in the study of DNA and molecular genetics, including gene cloning, sequencing, and mapping. Developments in molecular biology have opened new areas of study and provided powerful techniques that are revolutionizing the pharmaceutical, health, and agricultural industries. They have spawned new industries in biotechnology, and opened avenues for answering basic and applied questions in all of the life sciences.

**PROGRAM OBJECTIVES:**

The objectives of the molecular biology major are to provide a conceptual knowledge base and critical thinking skills related to the following areas:

- Molecular biology
- Cell biology
### Integrating themes (biochemistry, evolution, and diversity)
At the completion of the program, the student will be able to:

1. Possess basic knowledge and demonstrate critical thinking in molecular biology, cell biology, and evaluate literature in related areas.

2. Demonstrate basic laboratory skills including laboratory safety and basic molecular biology techniques.

3. Demonstrate laboratory thinking skills including cognitive processes, analytical skills, communication skills, and interpersonal and citizenry skills.

4. Demonstrate basic research skills to include formulating a clear, answerable question, developing a testable hypothesis, predicting expected results, developing, modifying, and/or following an experimental protocol, collecting and organizing data in a systematic fashion, presenting data in an appropriate form, assessing the validity of the data and drawing appropriate conclusions based on the results.

### CAREER OPPORTUNITIES:
Graduates are well prepared for continued study toward advanced degrees in agriculture, animal science biochemistry, biology, microbiology, molecular biology, medicine, and related fields or to enter the biotechnology work force. Molecular biology is an excellent pre-professional course of study for those interested in health professions, law, or business.

### FINANCING:
Students may be employed either as research or teaching assistants. Several endowed scholarships are available.

### 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
**Microbiology and Molecular Biology**  
Brigham Young University  
4007 Life Sciences Building  
Provo, UT 84602  
Telephone: (801) 422-2889

### ADVISEMENT CENTER INFORMATION
**Life Sciences Advisement**  
Brigham Young University  
2060 Life Sciences Building  
Provo, UT 84602  
Telephone: (801) 422-3042  
lifesciences@byu.edu