## 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>
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<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>
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<tr>
<td>The Individual and Society</td>
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<tr>
<td>Citizenship</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 &amp; Cultural Awareness</td>
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<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Skills</td>
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<tr>
<td>Effective Communication</td>
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<tr>
<td>First-Year Writing</td>
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<tr>
<td>Adv Written &amp; Oral Communication</td>
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<td>3.0</td>
<td>Engl 316 recommended</td>
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<tr>
<td>Quantitative Reasoning</td>
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<td>0–3.0</td>
<td>from approved list</td>
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<td>Languages of Learning (Math or Language)</td>
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<tr>
<td></td>
<td>1</td>
<td>4.0</td>
<td>Math 112* or 119*</td>
</tr>
<tr>
<td>Arts, Letters, and Sciences</td>
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<tr>
<td>Civilization 1 and 2</td>
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<td>6.0</td>
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<tr>
<td>Arts</td>
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<tr>
<td>Letters</td>
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<td>Scientific Principles &amp; Reasoning</td>
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<tr>
<td>Biological Science</td>
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<td>4.0</td>
<td>Bio 130* or MMBio 240* &amp; PDBio 120*</td>
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<tr>
<td>Physical Science</td>
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<td>7.0</td>
<td>Chem 105*, Phscs 105*</td>
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<tr>
<td>Social Science</td>
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<tr>
<td>Core Enrichment: Electives</td>
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<td>Religion Electives</td>
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<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
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### GRADUATION REQUIREMENTS:

| Minimum residence hours required | 30.0   |
| Minimum hours needed to graduate | 120.0  |

## PROGRAM REQUIREMENTS (64–67 total hours)

### Complete one of the following courses:

- Bio 130* Biology: 4.0
- PDBio 120* Science of Biology: 2.0

### Complete the following biology core courses:

- Bio 420 Evolutionary Biology: 2.0
- MMBio 240* Molecular Biology: 3.0
- MMBio 241 Molecular & Cellular Biology Lab: 1.0
- PDBio 360 Cell Biology: 3.0
- PWS 340 Genetics: 2.0

### Complete the following molecular biology core courses:

- MMBio 390R Readings in Molecular Biology: 1.0
- MMBio 441 Advanced Molecular Biology: 3.0
- MMBio 442 Advanced Molecular Biology Lab: 2.0
- MMBio 468 Genomics: 3.0
- MMBio 490R Molecular Biology Seminar: 1.0

### Complete the following chemistry courses:

- Chem 105* General College Chemistry: 4.0
- Chem 106 General College Chemistry: 3.0
- Chem 107 General College Chem Laboratory: 1.0
- Chem 351 Organic Chemistry: 3.0
- Chem 352 Organic Chemistry: 3.0
- Chem 353 Organic Chemistry Lab: 2.0
- Chem 481 Biochemistry 1: 3.0

### Complete the following physics courses:

- Phsces 105 Introductory Applied Physics: 3.0
- Phsces 106 Introductory Applied Physics: 3.0

### Complete three credits total during two semesters of mentored research:

- MMBio 194A Freshman Research Initiative 1: 2.0
- MMBio 194B Freshman Research Initiative 2: 2.0
- MMBio 494R Mentored Research: 3.0

### Complete one course from the following:

- Math 112* Calculus 1: 4.0
- Math 119* Introduction to Calculus: 4.0

### Note:
- Math 119 is offered through BYU Independent Study.

### Recommended Courses


### Note 1:
- Only 6 total credit hours of MMBio 194A, 194B, 399R, 470R, and 494R will count toward major hours with a 4 credit hour max. for each indiv. course.

### Note 2:
- † indicates a course with lab included.

### -Pass the Biology Major Field Exam.
- Complete an exit interview.
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 240 (Biological Science) 3.0
- MMBio 241 1.0
- Chem 106 3.0
- Chem 107 1.0
**Total Hours** 13.0

**SOPHOMORE YEAR**

3rd Semester
- Rel A 211 or 212 2.0
- Molecular Bio elective 4.0
- Math 112 or 119 4.0
- Phscs 105 (Physical Science) 3.0
- Civilization I elective 3.0
**Total Hours** 16.0

4th Semester
- PWS 340 2.0
- MMBio 494R 2.0
- Phscs 306 3.0
- Rel C 324 or 325 2.0
- Civilization 2 elective 3.0
- Social Science elective 3.0
**Total Hours** 15.0

**JUNIOR YEAR**

5th Semester
- Chem 351 3.0
- PDBio 360 3.0
- MMBio 494R 1.0
- Religion elective 2.0
- Letters elective 3.0
- Arts elective 3.0
**Total Hours** 15.0

6th Semester
- Chem 352 3.0
- Chem 353 1.0–2.0
- MMBio 390R 1.0
- MMBio 490R 1.0
- Molecular Biology elective 4.0
- Religion elective 2.0
- General elective 3.0
**Total Hours** 15–16.0

**SENIOR YEAR**

7th Semester
- Chem 481 3.0
- MMBio 441 3.0
- MMBio 442 2.0
- Molecular Biology elective 2.0
- Religion elective 2.0
- Global & Cultural Awareness elective 3.0
**Total Hours** 15.0

8th Semester
- Bio 420 2.0
- MMBio 468 3.0
- Adv. Writing (Eng 316 recommended) 3.0
- General electives 3-6.0
**Total Hours** 11-14.0

**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.

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

Note: This degree program requires a minimum of 120.0 hours for graduation. 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.

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