## 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>
<td>1</td>
<td>2.0</td>
<td>REL C 200</td>
</tr>
<tr>
<td><strong>The Individual and Society</strong></td>
<td></td>
<td></td>
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</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>
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<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>ENGL 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>
<td></td>
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<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>
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<tr>
<td>Arts</td>
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<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Letters</td>
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<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>
</tr>
<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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<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>

*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (16 hours overlap)

### Graduation Requirements:

- Minimum residence hours required: 30.0
- Minimum hours needed to graduate: 120.0

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## Suggested Sequence of Courses

### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
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</tr>
<tr>
<td>2nd</td>
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### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td></td>
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</table>

### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
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</tr>
<tr>
<td>4th</td>
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### SENIOR YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
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<tbody>
<tr>
<td>7th</td>
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<tr>
<td>8th</td>
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</tbody>
</table>

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

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

INTRODUCTORY CORE COURSES:
- BIO 130 - Biology 4.0
- MMBIO 121 - General Biology: Health and Disease 3.0
- *PDBIO 120 - Science of Biology 3.0

REQUIREMENT 2 Complete 3 courses

INTRODUCTORY CORE COURSES:
- MMBIO 240 - Molecular Biology 3.0
- MMBIO 241 - Molecular and Cellular Biology Laboratory 1.0
- PDBIO 360 - Cell Biology 3.0

REQUIREMENT 3 Complete 8 courses

MOLECULAR BIOLOGY COURSES:
- BIO 165 - Introduction to Bioinformatics 3.0
- BIO 250 - Evolutionary Medicine 2.0
- MMBIO 390R - Readings in Molecular Biology 1.0
  You may take this course up to 1 time.
- MMBIO 441 - Advanced Molecular Biology 3.0
- MMBIO 442 - Advanced Molecular Biology Laboratory 2.0
- MMBIO 468 - MMBio-Bio-PWS Genomics 3.0
- MMBIO 490R - Molecular Biology Seminar 1.0
  You may take this course up to 1 time.
- PWS 340 - Genomics 3.0

REQUIREMENT 4 Complete 4 courses

PHYSICAL SCIENCE COURSES:
- *CHEM 105 - General College Chemistry 1 with Lab (Integrated) 4.0
- CHEM 106 - General College Chemistry 2 3.0
- CHEM 107 - General College Chemistry Laboratory 1.0
- *PHSCS 105 - General Physics 1 3.0

REQUIREMENT 5 Complete 1 course

PHYSICAL SCIENCE COURSES (NOTE: FOR MEDICAL SCHOOL AND SOME GRADUATE SCHOOLS, CHEM 351, 352, 353, AND 481 ARE REQUIRED CLASSES. THESE CLASSES MAY BE USED AS ELECTIVES FOR THE MOLECULAR BIOLOGY DEGREE PROGRAM – SEE BELOW):
- CHEM 285 - Introductory Bio-organic Chemistry 4.0
- CHEM 351 - Organic Chemistry 1 3.0

REQUIREMENT 6 Complete 1 course

QUANTITATIVE COURSES (NOTE: MATH 119 IS OFFERED THROUGH BYU INDEPENDENT STUDY):
- *MATH 112 - Calculus 1 4.0
- MATH 119 - Introduction to Calculus 4.0
- STAT 121 - Principles of Statistics 3.0

REQUIREMENT 7 Complete 3.0 hours from the following course(s)

COMPLETE THREE CREDITS HOURS TOTAL DURING TWO SEMESTERS OF MENTORED RESEARCH:
- MMBIO 194 - Phage Hunters: Discovery 3.0
- MMBIO 195 - Phage Hunters: Comparative Genomics 3.0
- MMBIO 470R - (Not currently offered) 4.0
- MMBIO 494R - Advanced Mentored Research 3.0
  You may take up to 3 credit hours.

REQUIREMENT 8 Complete 9.0 hours from the following option(s)

ELECTIVES:
- OPTION 8.1 Complete up to 9.0 hours from the following course(s)
  - BIO 350 - Ecology 3.0
  - BIO 463 - Genetics of Human Disease 3.0
  - BIO 465 - Capstone in Bioinformatics 3.0
  - 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 122 - General Biology: Health and Disease Laboratory 1.0
  - MMBIO 151 - Introduction to Microbiology 4.0
  - MMBIO 162R - Careers in Biomedical Sciences 1.0
  - MMBIO 261 - Infection and Immunity 3.0
  - MMBIO 360 - Microbial Genetics 4.0
  - MMBIO 363 - Microbial Ecology 2.0
  - MMBIO 364 - Bacterial Pathogenesis 3.0
  - MMBIO 365 - Bacterial Pathogenesis Laboratory 1.0
  - MMBIO 366 - Microbial Ecology Laboratory 1.0
  - MMBIO 409 - Hematology 3.0
  - MMBIO 411 - Molecular Diagnostics 3.0
  - MMBIO 418 - Medical Parasitology 2.0
  - MMBIO 420 - Molecular Parasitology Laboratory 2.0
  - MMBIO 463 - Immunology 3.0
  - MMBIO 465 - Virology 3.0
  - MMBIO 466 - Virology Laboratory 1.0
  - MMBIO 467 - Virology Lab 1.0
  - MMBIO 471 - Applied and Industrial Microbiology 2.0
  - MMBIO 493R - Curriculum and Instruction Practicum 2.0
  - MMBIO 510 - History and Philosophy of Microbiology and Molecular Bi 2.0
  - MMBIO 512 - Gene Regulation 2.0

OPTION 8.2 Complete up to 6.0 hours from the following course(s)

ONLY 6 TOTAL CREDIT HOURS OF THE FOLLOWING WILL COUNT TOWARD MAJOR HOURS WITH A 4 CREDIT HOUR MAXIMUM FOR EACH INDIVIDUAL COURSE. (MORE CREDIT HOURS MAY BE TAKEN BUT THEY WILL NOT COUNT TOWARDS MAJOR REQUIREMENTS).

- MMBIO 194 - Phage Hunters: Discovery 3.0
- MMBIO 195 - Phage Hunters: Comparative Genomics 3.0
- MMBIO 294R - Mentored Research 3.0
- MMBIO 399R - Academic Internship 9.0
  You may take up to 4 credit hours.
- MMBIO 494R - Advanced Mentored Research 3.0
  You may take up to 4 credit hours.

REQUIREMENT 9

Pass the Biology Major Field Exam.

REQUIREMENT 10

Complete an exit interview.

RECOMMENDED Complete 4 courses

ALTHOUGH NOT REQUIRED, THE FOLLOWING COURSES ARE RECOMMENDED:

- ENGL 316 - Technical Communication 3.0
- PHSCS 107 - General Physics Lab 1 1.0
- PHSCS 108 - General Physics Lab 2 1.0

BS in Molecular Biology (285125)
2019-2020 Program Requirements (57 - 60 Credit Hours)
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