# BS in Molecular Biology (285125) MAP Sheet

For students entering the degree program during the 2023-2024 curricular year.

## University Core and Graduation Requirements

<table>
<thead>
<tr>
<th>Requirement</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>
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<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>
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</tr>
<tr>
<td>American Heritage</td>
<td>1-2</td>
<td>3.60</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>
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<tr>
<td>First Year Writing</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Advanced Written and Oral Communications</td>
<td>1</td>
<td>3.0</td>
<td>WRTG 316 recommended</td>
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<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>3.40</td>
<td>from approved list</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>3.40</td>
<td>MATH 112*, 119*, or STAT 121*</td>
</tr>
<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
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<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>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Letters</td>
<td>1-2</td>
<td>3.40</td>
<td>from approved list</td>
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<tr>
<td>Biological Science</td>
<td>1-2</td>
<td>3.0</td>
<td>CHEM 100*, PHYS 105*</td>
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<tr>
<td>Physical Science</td>
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<td>from approved list</td>
</tr>
<tr>
<td>Social Science</td>
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<tr>
<td><strong>Core Electives: Electives</strong></td>
<td>3-4</td>
<td>6.0</td>
<td>from approved list</td>
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<tr>
<td>Religion Electives</td>
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<tr>
<td>Open Electives</td>
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<td></td>
<td>Variable</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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### Freshman Year

**1st Semester**
- First-year Writing or American Heritage* 3.0
- REL A 275 2.0
- MMBIO 121 or BIO 130 or CELL 120 3.40
- CHEM 105 4.0
- Open electives 3.0
- Total Hours: **15-16.0**

**2nd Semester**
- First-year Writing or American Heritage* 3.0
- REL A 250 2.0
- MMBIO 240 3.0
- MMBIO 241 1.0
- CHEM 106 1.0
- CHEM 107 1.0
- Requirement 2 choice 3.0
- Total Hours: **14.0**

### Sophomore Year

**3rd Semester**
- BIO 165 3.0
- BIO 250 3.0
- MATH 112 or STAT 121 3.0-4.0
- PHYS 105 3.0
- Biology 1 elective 3.0
- Total Hours: **14.0-15.0**

**4th Semester**
- PKS 340 3.0
- MMBIO 468 3.0
- Requirement 3 choice 2.0
- Major Elective (Requirement 7) 3.0
- REL C 200 2.0
- Civilization 2 elective* 3.0
- Social Science elective* 3.0
- Total Hours: **16.0**

**5th Semester**
- CHEM 351 or CHEM 285 3.0
- CELL 360 3.0
- Religion elective* 2.0
- Letters elective* 3.0
- Arts elective* 3.0
- Total Hours: **14.0**

**6th Semester**
- MMIBIO 390R 1.0
- MMIBIO 490R 1.0
- Major electives (Requirement 7) 6.0
- REL C 125 2.0
- Requirement 2 choice 4.0-6.0
- Total Hours: **14.0-16.0**

**7th Semester**
- MMIBIO 441 3.0
- Open electives 2.0
- Major electives (Requirement 7) 3.0
- Religion elective 2.0
- Global & Cultural Awareness elective* 3.0
- Requirement 2 choice 1.30
- Total Hours: **14.0-16.0**

### Junior Year

**8th Semester**
- Religion Elective 2.0
- MMIBIO 468 3.0
- Requirement 3 choice 2.0
- Major Elective (Requirement 7) 3.0
- Open electives 3.60
- Total Hours: **13-14.0**

### Senior Year

**9th Semester**
- Total Hours: **16.0**

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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*
Program Requirements

Requirement 1 — Complete 1 of 3 Courses
BIO 130 - Biology 4.0
BIO 250 - Evolutionary Medicine 2.0
CELL 360 - Cell Biology 3.0

MMBIO 121 - Gen Biology 3.0

Requirement 2 — Complete 10 Courses
BIO 165 - Introduction to Bioinformatics 3.0
BIO 250 - Evolutionary Medicine 2.0
CELL 360 - Cell Biology 3.0
MMBIO 241 - Molecular & Cellular Bio Lab 1.0
MMBIO 385 - Genomics 3.0
MMBIO 491R - Molecular Biology Seminar - You may take once 1.0

CHEM 350 - Genetic Counseling 3.0
CHEM 360 - Bacterial Genetics 4.0
CHEM 363 - Microbial Ecology 2.0
CHEM 364 - Bacterial Pathogenesis 3.0
CHEM 365 - Bacterial Pathogenesis Lab 1.0
CHEM 366 - Microbial Ecology Lab 1.0

CHEM 285 - Organic Chemistry 1 3.0
CHEM 351 - Organic Chemistry 2 3.0
CHEM 352 - Organic Chemistry 3 3.0
CHEM 353 - Organic Chem Lab-Nonmajors 1.0v
CHEM 381 - Inorganic Chemistry 3.0
CHEM 481 - Biochemistry 3.0

CHEM 482 - Mechanisms of Molecular Biol 3.0
CHEM 484 - Organic Chemistry 4.0
CHEM 493R - Advanced Mentored Research - You may take up to 2.0 credit hours 0.5v

MMBIO 294R - Mentored Research - You may take up to 2.0 credit hours 0.5v

Requirement 4 — Complete 4 Courses
CHEM 105 - Gen College Chem 1+Lab Integr 4.0
CHEM 106 - General College Chemistry 2 3.0
CHEM 107 - Gen Coll Chem Lab 1.0
PHSCS 105 - General Physics 1 3.0

Requirement 5 — Complete 3 of 2 Courses
CHEM 285 - Intro Bio-organic Chemistry 4.0
CHEM 351 - Organic Chemistry 1 3.0

Requirement 6 — Complete 3 of 2 Courses
MATH 112 - Calculus 1 4.0
STAT 121 - Principles of Statistics 3.0

Requirement 7 — Complete 12 hours
A course used to fulfill requirements 1-6 may not be used to fulfill Requirement 7. For certain elective courses, a limited number of credit hours can count toward this elective requirement.

Option 7.1 — Complete at least 8 hours up to 12 hours
BIO 350 - Ecology 3.0
BIO 420 - Evolutionary Biology 4.0

BIO 463 - Genetics of Human Disease 3.0
BIO 465 - Capstone in Bioinformatics 3.0
CELL 305 - Human Physiology 4.0
CELL 325 - Tissue Biology (with lab) 3.0
CELL 362 - Advanced Physiology 3.0
CELL 363 - Adv Physiology Lab 1.0
CELL 382 - Developmental Biology 3.0

CELL 444 - Bio-Innovation 1 2.0
CELL 445 - Bio-Innovation II 2.0
CELL 582 - Developmental Genetics 3.0
CHEM 351 - Organic Chemistry 1 3.0
CHEM 352 - Organic Chemistry 2 3.0
CHEM 353 - Organic Chem Lab-Nonmajors 1.0v
CHEM 481 - Biochemistry 3.0
CHEM 482 - Mechanisms of Molecular Biol 3.0

MMBIO 110R - Extremophiles - You may take once 1.0
MMBIO 122 - Gen Biol: Health/Disease Lab 1.0
MMBIO 151 - Intro to Microbiology 4.0
MMBIO 162R - Careers in Biomed Sciences - You may take once 1.0
MMBIO 194 - Phage Discovery 3.0

MMBIO 195 - Phage Comparative Genomics 3.0
MMBIO 261 - Infection & Immunity 3.0
MMBIO 294R - Mentored Research - You may take up to 2.0 credit hours 0.5v

MMBIO 350 - Genetic Counseling 3.0
MMBIO 360 - Bacterial Genetics 4.0
MMBIO 363 - Microbial Ecology 2.0
MMBIO 364 - Bacterial Pathogenesis 3.0
MMBIO 365 - Bacterial Pathogenesis Lab 1.0

MMBIO 366 - Microbial Ecology Lab 1.0
MMBIO 399R - Academic Internship - You may take up to 2.0 credit hours 1.0v

MMBIO 409 - Hematology 3.0
MMBIO 411 - Molecular Diagnostics 3.0
MMBIO 418 - Medical Parasitology 2.0

MMBIO 461 - Advanced Bacterial Physiology 3.0
MMBIO 463 - Immunology 3.0
MMBIO 466 - Virology Laboratory 1.0

MMBIO 467 - Immunology Lab 1.0
MMBIO 471 - Applied Microbiology 2.0
MMBIO 493R - Curr and Instruct Practicum - You may take once 2.0
MMBIO 494R - Advanced Mentored Research - You may take up to 2.0 credit hours 0.5v

MMBIO 510 - Hist & Philos Micro & Mol Biol 2.0
MMBIO 512 - Gene Regulation 2.0

MMBIO 514 - Advanced Immunology 2.0
MMBIO 516 - Bacteria-Host Interactions 2.0
MMBIO 518 - Select Pathogens 2.0

MMBIO 520 - Molecular Virology 2.0
MMBIO 522 - Flow Cytometry 2.0
MMBIO 528R - Current Topics in Pathogenesis - You may take once 1.0

PHSCS 106 - General Physics 2 3.0

PWS 470 - Genomic Analysis 3.0

Option 7.2 — Complete up to 4 hours
CELL 210 - Human Anatomy (w/ virtual lab) 3.0

CELL 220 - Human Anatomy (with lab) 4.0

Requirement 8 — Complete 1 Course
MMBIO 498 - Reflections on Learning 0.0

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.

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

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