

# BS in Molecular Biology (285125) MAP Sheet

Life Sciences, Microbiology and Molecular Biology

For students entering the degree program during the 2018-2019 curricular year.



University Core and Graduation Requirements				Suggested Sequence of Courses		
<b>University Core Requirements:</b>						
<b>Requirements</b>	<b>#Classes</b>	<b>Hours</b>	<b>Classes</b>			
<b>Religion Cornerstones</b>				<b>FRESHMAN YEAR</b>		
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	<u>1st Semester</u>		<b>JUNIOR YEAR</b>
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	First-year Writing or American Heritage	3.0	<u>5th Semester</u>
Foundations of the Restoration	1	2.0	REL C 225	REL A 275	2.0	CHEM 351 or CHEM 285
The Eternal Family	1	2.0	REL C 200	MMBIO 121 or BIO 130 or PDBIO 120	3-4.0	PDBIO 360
<b>The Individual and Society</b>				CHEM 105	4.0	MMBIO 494R
American Heritage	1-2	3-6.0	from approved list	Open electives	3.0	Religion elective
Global and Cultural Awareness	1	3.0	from approved list	<b>Total Hours</b>	<b>15-16.0</b>	Letters
<b>Skills</b>				<u>2nd Semester</u>		Arts elective
First Year Writing	1	3.0	from approved list	First-year Writing or American Heritage	3.0	<b>Total Hours</b>
Advanced Written and Oral Communications	1	3.0	ENGL 316 recommended	REL A 250	2.0	<b>15.0</b>
Quantitative Reasoning	1	3-4.0	from approved list	MMBIO 240	3.0	<u>6th Semester</u>
Languages of Learning (Math or Language)	1	3-4.0	MATH 112*, 119*, or STAT 121*	MMBIO 241	1.0	MMBIO 390R
<b>Arts, Letters, and Sciences</b>				CHEM 106	3.0	MMBIO 490R
Civilization 1	1	3.0	from approved list	CHEM 107	1.0	Major electives
Civilization 2	1	3.0	from approved list	Open elective	3.0	BIO 250
Arts	1	3.0	from approved list	<b>Total Hours</b>	<b>16.0</b>	Open electives
Letters	1	3.0	from approved list	<b>SOPHOMORE YEAR</b>		<b>Total Hours</b>
Biological Science	1-2	3-4.0	BIO 130* or MMBIO 121	<u>3rd Semester</u>		<b>16.0</b>
Physical Science	1	3.0	CHEM 105*, PHSCS 105*	REL C 225	2.0	<u>7th Semester</u>
Social Science	1	3.0	from approved list	BIO 165	3.0	MMBIO 441
<b>Core Enrichment: Electives</b>				MATH 112 or 119 or STAT 121	3.0-4.0	MMBIO 442
Religion Electives	3-4	6.0	from approved list	PHSCS 105	3.0	Major electives
Open Electives	Variable	Variable	personal choice	Civilization 1 elective	3.0	Religion elective
				<b>Total Hours</b>	<b>14.0-15.0</b>	Global & Cultural Awareness elective
				<u>4th Semester</u>		Open elective
				PWS 340	3.0	<b>Total Hours</b>
				MMBIO 494R	2.0	<b>16.0</b>
				Open elective	3.0	<u>8th Semester</u>
				REL C 200	2.0	Religion Elective
				Civilization 2 elective	3.0	MMBIO 468
				Social Science elective	3.0	Adv. Written & Oral Communication (ENGL 316 recommended)
				<b>Total Hours</b>	<b>16.0</b>	Open electives
						3-6.0
						<b>Total Hours</b>
						<b>11-14.0</b>
<b>Graduation Requirements:</b>				<p>Note: Quantitative Reasoning elective fulfilled by Math 112 or Math 119.</p> <p>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.</p> <p>Note: Quantitative Reasoning can be fulfilled by ACT Math subscore of 22 or higher.</p>		
Minimum residence hours required		30.0				
Minimum hours needed to graduate		120.0				
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (16 hours overlap)						

**BS in Molecular Biology (285125)**  
**2018-2019 Program Requirements (57 - 60 Credit Hours)**

<p><b>REQUIREMENT 1</b> Complete 1 course  <b>INTRODUCTORY CORE COURSES:</b>            BIO 130 - Biology 4.0            MMBIO 121 - General Biology: Health and Disease 3.0            PDBIO 120 - Science of Biology 3.0</p> <p><b>REQUIREMENT 2</b> Complete 3 courses  <b>INTRODUCTORY CORE COURSES:</b>            MMBIO 240 - Molecular Biology 3.0            MMBIO 241 - Molecular and Cellular Biology Laboratory 1.0            PDBIO 360 - Cell Biology 3.0</p>	<p><b>REQUIREMENT 7</b> Complete 3.0 hours from the following course(s)  <b>COMPLETE THREE CREDITS HOURS TOTAL DURING TWO SEMESTERS OF MENTORED RESEARCH:</b>            MMBIO 194 - Phage Hunters: Discovery 3.0            MMBIO 195 - Phage Hunters: Comparative Genomics 3.0            MMBIO 470R - (Not currently offered)            MMBIO 494R - Advanced Mentored Research 3.0v  <i>You may take up to 3 credit hours.</i></p>	<p>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 1.0            PDBIO 220 - Human Anatomy (with lab) 3.0            PDBIO 305 - Human Physiology 4.0            PDBIO 325 - Tissue Biology (with lab) 3.0            PDBIO 362 - Advanced Physiology 3.0            PDBIO 363 - Advanced Physiology Laboratory 1.0            PDBIO 382 - Developmental Biology 3.0            PDBIO 444 - BIO-Innovation and -Entrepreneurship 1 2.0            PDBIO 445 - BIO-Innovation and -Entrepreneurship 2 2.0            PDBIO 582 - Developmental Genetics 3.0            PHSCS 106 - General Physics 2 3.0            PWS 470 - Analysis of Genetic and Genomic Data 2.0</p>
<p><b>REQUIREMENT 3</b> Complete 8 courses  <b>MOLECULAR BIOLOGY COURSES:</b>            BIO 165 - Introduction to Bioinformatics 3.0            BIO 250 - Evolutionary Medicine 2.0            MMBIO 390R - Readings in Molecular Biology 1.0  <i>You may take this course up to 1 time.</i>            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  <i>You may take this course up to 1 time.</i>            PWS 340 - Genetics 3.0</p>	<p><b>REQUIREMENT 8</b> Complete 9.0 hours from the following option(s)  <b>ELECTIVES:</b>  <b>OPTION 8.1</b> 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 2.0v            CHEM 481 - Biochemistry 3.0            CHEM 482 - Mechanisms of Molecular Biology 3.0            MMBIO 110R - Extremophiles: Life in Extreme Environments 1.0            MMBIO 122 - (Not currently offered)            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 3.0            MMBIO 364 - Bacterial Pathogenesis 3.0            MMBIO 365 - Bacterial Pathogenesis Laboratory 1.0            MMBIO 366 - (Not currently offered)            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 - Immunology 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</p>	<p><b>OPTION 8.2</b> Complete up to 6.0 hours from the following course(s)  <b>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).</b>            MMBIO 194 - Phage Hunters: Discovery 3.0            MMBIO 195 - Phage Hunters: Comparative Genomics 3.0            MMBIO 294R - Mentored Research 3.0v            MMBIO 399R - Academic Internship 9.0v  <i>You may take up to 4 credit hours.</i>            MMBIO 494R - Advanced Mentored Research 3.0v  <i>You may take up to 4 credit hours.</i></p>
<p><b>REQUIREMENT 4</b> Complete 4 courses  <b>PHYSICAL SCIENCE COURSES:</b>            *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</p> <p><b>REQUIREMENT 5</b> Complete 1 course  <b>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):</b>            CHEM 285 - Introductory Bio-organic Chemistry 4.0            CHEM 351 - Organic Chemistry 1 3.0</p>	<p><b>REQUIREMENT 9</b>            Pass the Biology Major Field Exam.</p>	<p><b>REQUIREMENT 10</b>            Complete an exit interview.</p>
<p><b>REQUIREMENT 6</b> Complete 1 course  <b>QUANTITATIVE COURSES (NOTE: MATH 119 IS OFFERED THROUGH BYU INDEPENDENT STUDY):</b>            *MATH 112 - Calculus 1 4.0            MATH 119 - Introduction to Calculus 4.0            STAT 121 - Principles of Statistics 3.0</p>	<p><b>RECOMMENDED</b> Complete 4 courses  <b>ALTHOUGH NOT REQUIRED, THE FOLLOWING COURSES ARE RECOMMENDED:</b>            ENGL 316 - Technical Communication 3.0            PHSCS 107 - General Physics Lab 1 1.0            PHSCS 108 - General Physics Lab 2 1.0</p>	

## BS in Molecular Biology (285125) 2018-2019 Program Requirements Cont...

STAT 121 - Principles of Statistics

3.0

### 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  
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Provo, UT 84602  
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### ADVISEMENT CENTER INFORMATION

#### Life Sciences Advisement

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