BS in MOLECULAR BIOLOGY (285125) MAP Sheet

Department of Microbiology and Molecular Biology

For students entering the degree program during the 2016–2017 curricular year.

UNIVERSITY CORE AND GRADUATION REQUIREMENTS

UNIVERSITY CORE REQUIREMENTS

Requirements	#Classes	Hours	Classes
Religion Cornerstones			
Teachings & Doctrine, Book of Mormon	1	2.0	Rel A 275
Jesus Christ & the Everlasting Gospel	1	2.0	Rel A 250
Foundations of the Restoration	1	2.0	Rel C 225
The Eternal Family	1	2.0	Rel C 200
The Individual and Society			
Citizenship			
American Heritage	1–2	3–6.0	from approved list
Global & Cultural Awareness	1	3.0	from approved list
Skills			
Effective Communication			
First-Year Writing	1	3.0	from approved list
Adv Written & Oral Communication	1	3.0	Engl 316 recommended
Quantitative Reasoning	0–1	0–3.0	from approved list
Languages of Learning (Math or Language)	1	3-4.0	Math 112*, 119*, or Stat 121*
Arts, Letters, and Sciences			
Civilization 1 and 2	2	6.0	from approved list
Arts	1	3.0	from approved list
Letters	1	3.0	from approved list
Scientific Principles & Reasoning			
Biological Science	2	4-5.0	Bio 130*, or MMBio 121, or MMBio 240* & PDBio 120*
Physical Science	2	7.0	Chem 105*, Phscs 105*
Social Science	1	3.0	from approved list
Core Enrichment: Electives			
Religion Electives	3–4	6.0	from approved list
Open Electives	Variable	Variable	personal choice

GRADUATION REQUIREMENTS:

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)

PROGRAM REQUIREMENTS (56–60 total hours)

Complete one of the following introductory courses:

Bio	130*	Biology	4.0
MMBio	121*	General Biology: Hlth & Disease	3.0
PDBio	120*	Science of Biology	2.0

Complete the following introductory core courses:

MMBio	240*	Molecular Biology	3.0
MMBio	241	Molecular & Cellular Biology Lab	1.0
PDBio	360	Cell Biology	3.0

Complete the following molecular biology core courses:

Bio	165	Intro to Bioinformatics	3.0
Bio	420	Evolutionary Biology	2.0
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
PWS	340	Genetics	3.0

Complete the following physical science courses:

Chem	105*	General College Chemistry	4.0
Chem	106	General College Chemistry	3.0
Chem	107	General College Chem Laboratory	1.0
Phscs	105*	General Physics 1	3.0

Complete one of the following physical science courses:

Chem	285	Intro Bio-organic Chemistry	4.0
Chem	351	Organic Chemistry	3.0

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).

Complete one of the following quantitative courses:

Math	112*	Calculus 1	4.0
Math	119*	Introduction to Calculus	4.0
Stat	121*	Principles of Statistics	3.0

Note: Math 119 is offered through BYU Independent Study.

Complete three credit hours total during TWO SEMESTERS of mentored research:

MMBio 194A	Phage Discovery	2.0
MMBio 194B	Phage Comparative Genomics	2.0
MMBio 470R	Synthetic Biology	2.0V
MMBio 494R	Mentored Research	3.0V

Complete at least 9 hours from the following:

Bio	350	Ecology	3.0
Bio	421	Evolutionary Biology Laboratory	1.0
Bio	463	Genetics of Human Disease	3.0
Bio	465	Bioinformatics & Proteomics	3.0
Chem	351	Organic Chemistry	3.0
Chem	352	Organic Chemistry	3.0
Chem	353	Organic Chemistry Lab–Nonmajors	2.0V
Chem	481	Biochemistry	3.0
Chem	482	Mechanisms of Molecular Biology	3.0
MMBio	110R	Extremophiles	1.0
MMBio	151	Introduction to Microbiology	4.0
MMBio	162R	Careers in Biomedical Sciences	1.0
MMBio	194A	Phage Hunters: Discovery	2.0
MMBio	194B	Phage Hunters: Comp Genomics	2.0
MMBio	261	Infection and Immunity	3.0
MMBio	360	Microbial Genetics	4.0
MMBio	364	Bacterial Pathogenesis	4.0
MMBio	399R	Academic Internship	9.0V
MMBio	417	Medical Parasitology	3.0
MMBio	430	Advanced Cell Biology	3.0
MMBio	463	Immunology	3.0
MMBio	465	Virology	3.0
MMBio	466	Virology Laboratory	1.0
MMBio	467	Immunology Lab	1.0
MMBio	470R	Synthetic Biology	2.0V
MMBio	494R	Mentored Research	3.0V
MMBio	510	History and Philosophy of MMBio	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	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	482	Developmental Biology	3.0
PDBio	582	Developmental Genetics	3.0
Phscs	106	General Physics 2	3.0

Note: 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 individual course. (More credit hours may be taken but they will not count towards major requirements.)

Pass the Biology Major Field Exam.

Complete an exit interview.

Recommended Courses

Engl 316, Phscs 107, 108, Stat 121.

FOR UNIVERSITY CORE QUESTIONS CONTACT THE ADVISEMENT CENTER ◆ FOR PROGRAM QUESTIONS SEE YOUR FACULTY ADVISOR

BS in MOLECULAR BIOLOGY (285125)

2016–2017

Suggested Sequence of Courses:

FRESHMAN YEAR

1st Semester

First-Year Writing or A Htg 100	3.0
Rel A 275	2.0
MMBio 121 or 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 250	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 C 225	2.0
Bio 165	3.0
Math 112 or 119	4.0
Phscs 105 (Physical Science)	3.0
Civilization I elective	3.0
Total Hours	**15.0**

4th Semester

PWS 340	3.0
MMBio 494R	2.0
Phscs 106	3.0
Rel C 200	2.0
Civilization 2 elective	3.0
Social Science elective	3.0
Total Hours	**16.0**

JUNIOR YEAR

5th Semester

Chem 351 or Chem 285	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

MMBio 390R	1.0
MMBio 490R	1.0
Molecular Biology elective	9.0
Religion elective	2.0
Total Hours	**13.0**

SENIOR YEAR

7th Semester

MMBio 441	3.0
MMBio 442	2.0
Molecular Biology elective	5.0
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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