



BS in GENETICS, GENOMICS, AND BIOTECHNOLOGY (285823) MAP Sheet

Department of Plant and Wildlife Sciences

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

UNIVERSITY CORE AND GRADUATION REQUIREMENTS				PROGRAM REQUIREMENTS (60-62 total hours)			
UNIVERSITY CORE REQUIREMENTS				Complete the following core courses:			
<u>Requirements</u>	<u>#Classes</u>	<u>Hours</u>	<u>Classes</u>	Bio 165	Introduction to Bioinformatics	3.0	
Religion Cornerstones				Chem 105*	General College Chemistry	4.0	
Teachings & Doctrine, Book of Mormon	1	2.0	Rel A 275	Chem 106	General College Chemistry	3.0	
Jesus Christ & the Everlasting Gospel	1	2.0	Rel A 250	Chem 107	General College Chemistry Lab	1.0	
Foundations of the Restoration	1	2.0	Rel C 225	Math 112	Calculus 1	4.0	
The Eternal Family	1	2.0	Rel C 200	MMBio 240*	Molecular Biology	3.0	
				PDBio 360	Cell Biology	3.0	
				PWS 188	Intro to Genetics, Genomics & Biotechnology	1.0	
The Individual and Society				PWS 340	Genetics	3.0	
Citizenship				PWS 468	Genomics	3.0	
American Heritage	1–2	3–6.0	from approved list	PWS 469	Metagenomics	2.0	
Global & Cultural Awareness	1	3.0	from approved list	PWS 488	Readings in Biotechnology	3.0	
Skills							
Effective Communication				Complete one course from the following:			
First-Year Writing	1	3.0	from approved list	MMBio 121	General Biology: Health & Disease	3.0	
Adv Written & Oral Communication	1	3.0	Engl 316 recommended	PDBio 120*	Science of Biology	2.0	
Quantitative Reasoning	1	4.0	from approved list	Note: MMBio 121 is recommended for Track C, and PDBio 120 for Tracks A and B.			
Languages of Learning (Math or Language)	1	4.0	Math 112* or 119*	Complete one course from the following:			
				MMBio 241	Molecular and Cellular Biology Lab	1.0	
Arts, Letters, and Sciences				PWS 288	Mentored Lab Techniques	2.0	
Civilization 1 and 2	2	6.0	from approved list	Note: PWS 288 recommended for all tracks.			
Arts	1	3.0	from approved list	Complete 24 hours from one of the following tracks:			
Letters	1	3.0	from approved list	A. Plant Genetics and biotechnology core track:			
Scientific Principles & Reasoning				Complete the following:			
Biological Science	2	5.0	MMBio 240* and PDBio 120*	Bio 230	Biological Diversity: Plants	4.0	
Physical Science	2	6–7.0	Chem 105* + one course from approved list	Bio 420	Evolutionary Biology	2.0	
Social Science	1	3.0	from approved list	Chem 351	Organic Chemistry	3.0	
				Chem 352	Organic Chemistry	3.0	
				Chem 481	Biochemistry	3.0	
Core Enrichment: Electives				PWS 100	Plants in the Environment	3.0	
Religion Electives	3–4	6.0	from approved list	PWS 440	Plant Physiology	3.0	
Open Electives	Variable	Variable	personal choice	Complete an additional 3 hours from the general major electives list below.			
				B. Biomedical genetics core track:			
				Complete the following:			
				Bio 420	Evolutionary Biology	2.0	
				Chem 351	Organic Chemistry	3.0	
				Chem 352	Organic Chemistry	3.0	
				Chem 481	Biochemistry	3.0	
				Complete one course from the following:			
				Bio 463	Genetics of Human Disease	3.0	
				PDBio 482	Developmental Biology	3.0	
GRADUATION REQUIREMENTS:				Complete one course from the following:			
Minimum residence hours required		30.0		Bio 380	Comparative Animal Phys & Anatomy	4.0	
Minimum hours needed to graduate		120.0		PDBio 305	Human Physiology	3.0	
				PDBio 362	Advanced Physiology	3.0	
				Complete an additional 6-7 hours from the general major electives list below.			
				C. Microbial genetics and biotechnology core track:			
				Complete the following:			
				Bio 420	Evolutionary Biology	2.0	
				Chem 351	Organic Chemistry	3.0	
				Chem 352	Organic Chemistry	3.0	
				Chem 481	Biochemistry	3.0	
				MMBio 151	Introduction to Microbiology	4.0	
				MMBio 360	Microbial Genetics	4.0	
				MMBio 461	Advanced Bacterial Physiology	3.0	
				Complete an additional two hours from the general major electives list below.			
				D. Bio-business core track:			
				Complete the following:			
				Acc 200	Principles of Accounting	3.0	
				Bus M 201	Financial Management	3.0	
				Bus M 488	Agribusiness Management 1	3.0	
				Chem 285	Introductory Bio-organic Chemistry	4.0	
				Org B 320	Organizational Effectiveness	3.0	
				Complete one of the following:			
				Bus M 241	Marketing Management	3.0	
				Bus M 489	Agribusiness Management 2	3.0	
				Complete one of the following:			
				Bus M 371R	Entrepreneurship Lecture Series	1.0	
				Bus M 380	Executive Lectures	1.0	
				Complete an additional 4 hours from the general major electives list below.			
				General Major Electives:			
				Bio 220A	Biological Diversity: Animals	4.0	
				Bio 220B	Biological Diversity: Plants	4.0	
				Bio 350	Ecology	3.0	
				Bio 365	Computational Biology	3.0	
				Bio 370	Bioethics	2.0	
				Bio 420	Evolutionary Biology	2.0	
				Bio 421	Evolutionary Biology Laboratory	1.0	
				Bio 430	Plant Classification & ID	4.0	
				Bio 450	Conservation Biology	3.0	
				Bio 463	Genetics of Human Disease	3.0	
				Bio 465	Bioinformatics & Proteomics	3.0	
				Bio 494R	Mentored Research	6.0V	
				Bio 560	Population Genetics	4.0	
				(continued on back of this page)			
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (13 hours overlap)							

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2016–2017

Chem 353	Organic Chemistry Lab-Nonmjrs	2.0V
Chem 497R	Undergrad Special Problems	6.0V
ExSc 497R	Undergrad Research & Study	4.0V
MMBio 221	General Microbiology	3.0
MMBio 241	Molecular & Cellular Biology Lab	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	4.0
MMBio 390R	Readings in Molecular Biology	1.0
MMBio 430	Advanced Cell Biology	3.0
MMBio 441	Advanced Molecular Biology	3.0
MMBio 442	Advanced Molecular Biology Lab	2.0
MMBio 461	Advanced Bacterial Physiology	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 490R	Molecular Biology Seminar	1.0
MMBio 494R	Mentored Research	3.0V
MMBio 557	Genes and Cancer	2.0
NDFS 330	Comparative Animal Nutrition	3.0
NDFS 494R	Undergrad Research in NDFS	3.0V
PDBio 325	Tissue Biology (with Lab)	3.0
PDBio 363	Advanced Physiology Laboratory	1.0
PDBio 482	Developmental Biology	3.0
PDBio 494R	Undergrad Research in PDBio	4.0V
PDBio 495R	Adv. Undergrad Rsrch in PDBio	4.0V
PDBio 562	Reproductive Physiology	3.0
PDBio 582	Developmental Genetics	3.0
PWS 100	Living with Plants	3.0
PWS 199R	Academic Internship	3.0V
PWS 282	Introduction to Soil Science	3.0
PWS 283	Introduction to Soil Science Lab	1.0
PWS 301	Plant Growth and Reproduction	3.0
PWS 305	Soils and Water Quality	3.0
PWS 306	Soil & Water Quality Lab	1.0
PWS 331	Science of Plant Pest Control	3.0
PWS 365	Enviro Microbio & Biogeochemistry	3.0
PWS 366	Enviro Micro & Biogeochemistry Lab	1.0
PWS 431	Plant Health Diagnostics	3.0
PWS 494R	Mentored Learning Experience	6.0V
PWS 514	Soil Microbiology	2.0
PWS 559	Molecular Plant Breeding	3.0
PWS 575	Plant Pathology	3.0
PWS 586	Plant Cell Biology	3.0
Stat 121	Principles of Statistics	3.0
Stat 201	Stats for Engineers & Scientists	3.0

Recommended courses

For preprofessional students in tracks A, B, or C above:

Acc 200
Bus M 201
Phscs 105, 106, 107, 108

For graduate school preparation in biotechnology:

Phscs 105, 106, 107, 108

For graduate school preparation in biotechnology:

Phscs 105, 106, 107, 108

For students seeking employment in the biotech industry:

PWS 199R

GE courses for bio-business students seeking a Marriott

School of Management minor:

Econ 110

Stat 121

**Careers in Genetics & Biotechnology, Fall of Sophomore year

for all non-premed/preudent students

Suggested Sequence of Courses:

FRESHMAN YEAR

1st Semester

PDBio 120	2.0
Chem 105	4.0
1 st Yr. Writing or American Heritage	3.0
Religion Cornerstone course	2.0
Quantitative Reasoning (if needed)	3–4.0
Total Hours	14–15.0

2nd Semester

1 st Yr. Writing or American Heritage	3.0
MMBio 240 (Biological Science)	3.0
Chem 106, 107	4.0
Bio 165	3.0
Religion Cornerstone course	2.0
PWS 188	2.0
Total Hours	17.0

SOPHOMORE YEAR

3rd Semester

Math 112 (Languages of Learning)	4.0
PWS 288	2.0
PWS 340	3.0
Physical Science elective	3.0
Religion Cornerstone course	2.0
Total Hours	14.0

4th Semester

Civilization 1 elective	3.0
Religion Cornerstone course	2.0
Acc 200 (Bus. track)	(3.0)
Econ 110 (Bus. track)	(3.0)
Bio 220a	4.0
or MMBio 151	(4.0)
or PWS 100	(3.0)
Arts or Letters elective	3.0
Total Hours	17–18.0

JUNIOR YEAR

5th Semester

Advanced Written & Oral Communication	3.0
PDBio 360	3.0
Chem 351 (Science track)	3.0
or Chem 285 (Bus. track)	(4.0)
Bus M 300 (Bus. Track)	(3.0)
Civilization 2 elective	3.0
Religion elective 2.0	
Total Hours	14–18.0

6th Semester

Chem 352 (Science track)	3.0
Physiology (Science track)	3.0--
Org B 320 (Bus. track)	(3.0)
PWS 288 (Bus. track)	(2.0)
Arts or Letters elective	3.0
Major elective	2.0
General electives	3.0
Total Hours	15.0-- 16.0

SENIOR YEAR

7th Semester

Bio 420 (Science track)	2.0
Bus M 488 (Bus. track)	(3.0)
MMBio 360 (Microb. track)	(4.0)
or PDBio 482 (Animal track)	(3.0)
or PWS 485 (Plant track)	(2.0)
PWS 468	3.0
Stat 121 (Bus. track)	3.0
Religion elective 2.0	
Social Science elective	3.0
Major elective	2.0
Total Hours	15.0

8th Semester

Bus M 489 (Bus. track)	(3.0)
PWS 469	2.0
PWS 488	3.0
Chem 481 (Science track)	3.0
Global & Cultural Awareness elective	3.0
Religion elective 2.0	
General electives	4.0
Total Hours	18.0

Note: The above course of study provides a guide in planning. However to meet special needs and interests of each student the courses taken and the order in which they are taken may require alteration. Study the requirements, plan a course of study, and consult with an advisor early in the program. This will save considerable time and minimize frustration.

THE DISCIPLINE:

This unique degree is for students who desire combined training in biotechnology and plant genetics. It is a relatively new discipline representing one of the most exciting developments in biological sciences in the 21st century. Students completing this degree will find themselves in the very forefront of biology in the 21st century.

CAREER OPPORTUNITIES:

The major is designed to provide a broad range of skills, including the following: quantitative reasoning; interpretation of scientific literature; recognition of historical and current scientific trends; principles of scientific data collection, interpretation, and assimilation; and critical writing. Graduates enter directly into industry, medical schools, or graduate programs in any of the many biological science disciplines.

HANDS-ON LEARNING OPPORTUNITIES:

Every student in this major is encouraged to seek mentored research opportunities with faculty in the life sciences. Completing one or more of these mentored research opportunities will set students apart and provide experience and credentials valuable in being admitted into the best graduate programs in the U.S.

FINANCING:

Scholarships are available for qualified students from the department, college, and university.

HONORARY SOCIETIES AND CLUBS:

The program encourages student participation in the Genetics and Biotechnology Club. Genetics students share a common study area, the Mendel Lab, in room 5114 LSB. Students are also active participants in professional societies; national honor societies; and in other BYU campus academic, service, and social clubs. For more information on the Genetics and Biotechnology Club, contact Dr. Joshua Udall at (801) 422-9307.

Note 1: 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.

Note 2: Business majors should do PWS 199R (Academic Internship) during summer between Junior and Senior years.

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