



**BS in GENETICS AND BIOTECHNOLOGY (285823) Map Sheet**  
**Department of Plant and Wildlife Sciences**  
 For students entering the degree program during the 2012–2013 curricular year.

**UNIVERSITY CORE AND GRADUATION REQUIREMENTS**

**PROGRAM REQUIREMENTS (61.0 total hours)**

UNIVERSITY CORE REQUIREMENTS	#Classes	Hours	Classes
<b>Requirements</b>			
<b>Doctrinal Foundation</b>	2	4.0	Rel A 121 and 122
Book of Mormon	1	2.0	Rel A 211 or 212
New Testament	1	2.0	Rel C 324 or 325
Doctrine and Covenants			
<b>The Individual and Society</b>	1–2	3–6.0	from approved list
Citizenship			
American Heritage	1	3.0	from approved list
Global & Cultural Awareness			
<b>Skills</b>			
Effective Communication	1	3.0	from approved list
First-Year Writing	1	3.0	Engl 316 recommended
Adv Written & Oral Communication	1	4.0	from approved list
Quantitative Reasoning	1	4.0	Math 112* or 119*
Languages of Learning (Math or Language)	1	4.0	
<b>Arts, Letters, and Sciences</b>			
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	2	5.0	MMBio 240* and PDBio 120*
Biological Science			
Physical Science	2	6–7.0	Chem 105* + one course from approved list
Social Science	1	3.0	from approved list
<b>Core Enrichment: Electives</b>			
Religion Electives	3–4	6.0	from approved list
Open Electives	Variable	Variable	personal choice
<b>GRADUATION REQUIREMENTS:</b>			
Minimum residence hours required		30.0	
Minimum hours needed to graduate		120.0	
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (13.0 hours overlap)			

  

<p><b>Complete the following core courses:</b></p> <p>Bio 165 Introduction to Bioinformatics 3.0</p> <p>Chem 105* General College Chemistry 4.0</p> <p>Chem 106 General College Chemistry 3.0</p> <p>Chem 107 General College Chemistry Lab 1.0</p> <p>MMBio 240* Molecular Biology 3.0</p> <p>PDBio 120* Science of Biology 2.0</p> <p>PDBio 360 Cell Biology 3.0</p> <p>PWS 188 Introduction to Genetics &amp; Biotechnology 2.0</p> <p>PWS 288 Mentored Laboratory Techniques 2.0</p> <p>PWS 340 Genetics 2.0</p> <p>PWS 468 Genomics 3.0</p> <p>PWS 488 Readings in Biotechnology 2.0</p> <p><b>Complete one course from the following:</b></p> <p>Math 112 Calculus 1 4.0</p> <p>Math 119 Introduction to Calculus 4.0</p> <p><b>Complete 26 hours from one of the following tracks:</b></p> <p><b>A. Plant Genetics and biotechnology core track:</b></p> <p><b>Complete the following:</b></p> <p>Bio 220B Biological Diversity: Plants 4.0</p> <p>Bio 420 Evolutionary Biology 2.0</p> <p>Chem 351 Organic Chemistry 3.0</p> <p>Chem 352 Organic Chemistry 3.0</p> <p>Chem 481 Biochemistry 1 3.0</p> <p>PWS 100 Living with Plants 3.0</p> <p>PWS 440 Plant Physiology 3.0</p> <p>PWS 494R Mentored Learning Experience (2 hours required) 6.0V</p> <p><b>Complete an additional 3 hours from the general major electives list below.</b></p> <p><b>B. Animal genetics and biotechnology core track:</b></p> <p><b>Complete the following:</b></p> <p>Bio 420 Evolutionary Biology 2.0</p> <p>Chem 351 Organic Chemistry 3.0</p> <p>Chem 352 Organic Chemistry 3.0</p> <p>Chem 481 Biochemistry 1 3.0</p> <p>PDBio 482 Developmental Biology 3.0</p> <p><b>Complete one of the following:</b></p> <p>Bio 380 Comparative Animal Phys &amp; Anatomy 4.0</p> <p>PDBio 362 Advanced Physiology 3.0</p> <p><b>Complete 2 hours from one of the following:</b></p> <p>Bio 494R Mentored Research 6.0V</p> <p>Chem 497R Undergraduate Special Problems 6.0V</p> <p>MMBio 494R Mentored Research 3.0V</p> <p>NDFS 494R Undergraduate Research in NDFS 3.0V</p> <p>PDBio 494R Undergraduate Research in PDBio 4.0V</p> <p>PWS 494R Mentored Learning Experience 6.0V</p> <p><b>Complete an additional 6–7 hours from the general major electives list below.</b></p>	<p><b>C. Microbial genetics and biotechnology core track:</b></p> <p><b>Complete the following:</b></p> <p>Bio 420 Evolutionary Biology 2.0</p> <p>Chem 351 Organic Chemistry 3.0</p> <p>Chem 352 Organic Chemistry 3.0</p> <p>Chem 481 Biochemistry 1 3.0</p> <p>MMBio 151 Introduction to Microbiology 4.0</p> <p>MMBio 360 Microbial Genetics 4.0</p> <p>MMBio 461 Advanced Bacterial Physiology 3.0</p> <p><b>Complete 2 hours from one of the following:</b></p> <p>MMBio 494R Mentored Research 3.0V</p> <p>PWS 494R Mentored Learning Experience 6.0V</p> <p><b>Complete an additional two hours from the general major electives list below.</b></p> <p><b>D. Bio-business core track:</b></p> <p><b>Complete the following:</b></p> <p>Acc 200 Principles of Accounting 3.0</p> <p>Bus M 201 Financial Management 3.0</p> <p>Bus M 488 Agribusiness Management 3.0</p> <p>Chem 285 Introductory Bio-organic Chemistry 4.0</p> <p>Org B 221 Organizational Effectiveness 3.0</p> <p><b>Complete one of the following:</b></p> <p>Bus M 241 Marketing Management 3.0</p> <p>Bus M 489 Agribusiness Management 2 3.0</p> <p><b>Complete one of the following:</b></p> <p>Bus M 371R Entrepreneurship Lecture Series 1.0</p> <p>Bus M 380 Executive Lectures 1.0</p> <p><b>Complete an additional 6 hours from the general major electives list below.</b></p> <p><b>General Major Electives:</b></p> <p>Bio 220A Biological Diversity: Animals 4.0</p> <p>Bio 220B Biological Diversity: Plants 4.0</p> <p>Bio 350 Ecology 3.0</p> <p>Bio 365 Computational Biology 3.0</p> <p>Bio 370 Bioethics 2.0</p> <p>Bio 420 Evolutionary Biology 2.0</p> <p>Bio 421 Evolutionary Biology Laboratory 1.0</p> <p>Bio 430 Plant Classification 3.0</p> <p>Bio 450 Conservation Biology 3.0</p> <p>Bio 465 Bioinformatics 3.0</p> <p>Bio 560 Population Genetics 4.0</p> <p>Chem 353 Organic Chemistry Lab—Nonmajors 2.0V</p> <p>MMBio 221 General Microbiology 3.0</p> <p>MMBio 241 Molecular &amp; Cellular Biology Lab 1.0</p> <p>MMBio 261 Infection and Immunity 3.0</p> <p>MMBio 390R Readings in Molecular Biology 1.0</p>
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# BS in GENETICS AND BIOTECHNOLOGY (285823) 2012-2013

MMBio 430	Advanced Cell Biology	3.0	
MMBio 441	Advanced Molecular Biology	3.0	
MMBio 442	Advanced Molecular Biology Lab	2.0	
MMBio 460	Microbial Genetics	4.0	
MMBio 461	Advanced Bacterial Physiology	3.0	
MMBio 462	Microbial Ecology	3.0	
MMBio 463	Immunology	3.0	
MMBio 464	Bacterial Pathogenesis	4.0	
MMBio 465	Virology	3.0	
MMBio 466	Virology Laboratory	1.0	
MMBio 467	Immunology Lab	1.0	
MMBio 490R	Molecular Biology Seminar	1.0	
NDFS 330	Comparative Animal Nutrition	3.0	
PDBio 325	Tissue Biology (with Lab)	3.0	
PDBio 363	Advanced Physiology Laboratory	1.0	
PDBio 482	Developmental Biology	3.0	
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 Fertility & Plant Nutrition Lab	1.0	
PWS 331	Science of Plant Pest Control	3.0	
PWS 431	Integrated Management of Plant Pests	3.0	

*Suggested Sequence of Courses:*

<b>FRESHMAN YEAR</b>		
1st Semester		
PDBio 120	Chem 105	2.0
1 <sup>st</sup> Yr. Writing or American Heritage	Rel A 121	4.0
Quantitative Reasoning (if needed)		3.0
<b>Total Hours</b>		<b>14-15.0</b>

<b>2nd Semester</b>		
1 <sup>st</sup> Yr. Writing or American Heritage	MMBio 240 (Biological Science)	3.0
Chem 106, 107	Bio 165	3.0
Rel A 122	Rel A 122	3.0
PWS 188	PWS 188	2.0
<b>Total Hours</b>		<b>17.0</b>

**SOPHOMORE YEAR**

<b>3rd Semester</b>		
Math 112 or 119 (Languages of Learning)	PWS 288	4.0
PWS 340	Physical Science elective	2.0
Rel A 211 or 212	Rel A 211 or 212	3.0
<b>Total Hours</b>		<b>13.0</b>

<b>4th Semester</b>		
Civilization 1 elective	Religion elective	3.0
Acc 200 (Bus. track)	Econ 110 (Bus. track)	2.0
Econ 110 (Bus. track)	Bio 220a	(3.0)
Bio 220a	or MMBio 151	4.0
or MMBio 151	or PWS 100	(4.0)
Arts or Letters elective	<b>Total Hours</b>	3.0
		<b>17-18.0</b>

<b>5th Semester</b>		
Advanced Written & Oral Communication	PDBio 360	3.0
Chem 351 (Science track)	or Chem 295 (Bus. track)	3.0
Bus M 300 (Bus. Track)	Civilization 2 elective	(4.0)
Rel C 324 or 325		(3.0)
<b>Total Hours</b>		<b>14-18.0</b>

<b>6th Semester</b>		
Chem 352 (Science track)	Physiology (Science track)	3.0
Orig B 320 (Bus. track)	PWS 288 (Bus. track)	3.0-4.0
PWS 288 (Bus. track)	Arts or Letters elective	(3.0)
Major elective	General electives	(2.0)
<b>Total Hours</b>		<b>15.0-16.0</b>

<b>7th Semester</b>		
Bio 420 (Science track)	Bus M 488 (Bus. track)	2.0
Bus M 488 (Bus. track)	MMBio 360 (Microb. track)	(3.0)
MMBio 360 (Microb. track)	or PDBio 482 (Animal track)	(4.0)
or PDBio 482 (Animal track)	or PWS 485 (Plant track)	(3.0)
PWS 488	Stat 121 (Bus. track)	(2.0)
Stat 121 (Bus. track)	Religion elective	3.0
Religion elective	Social Science elective	2.0
Social Science elective	Major elective	3.0
Major elective	<b>Total Hours</b>	2.0
<b>Total Hours</b>		<b>15.0</b>

<b>8th Semester</b>		
Bus M 489 (Bus. track)	PWS 488	(3.0)
PWS 488	Chem 481 (Science track)	3.0
Chem 481 (Science track)	Global & Cultural Awareness elective	3.0
Global & Cultural Awareness elective	General electives	6.0
General electives	<b>Total Hours</b>	6.0
<b>Total Hours</b>		<b>15.0</b>

**JUNIOR YEAR**

**5th Semester**  
Advanced Written & Oral Communication  
PDBio 360  
Chem 351 (Science track)  
or Chem 295 (Bus. track)  
Bus M 300 (Bus. Track)  
Civilization 2 elective  
Rel C 324 or 325  
**Total Hours** 14-18.0

**6th Semester**  
Chem 352 (Science track)  
Physiology (Science track)  
Orig B 320 (Bus. track)  
PWS 288 (Bus. track)  
Arts or Letters elective  
Major elective  
General electives  
**Total Hours** 15.0-16.0

**SENIOR YEAR**

**7th Semester**  
Bio 420 (Science track)  
Bus M 488 (Bus. track)  
MMBio 360 (Microb. track)  
or PDBio 482 (Animal track)  
or PWS 485 (Plant track)  
PWS 488  
Stat 121 (Bus. track)  
Religion elective  
Social Science elective  
Major elective  
**Total Hours** 15.0

**8th Semester**  
Bus M 489 (Bus. track)  
PWS 488  
Chem 481 (Science track)  
Global & Cultural Awareness elective  
General electives  
**Total Hours** 15.0

**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 PWSM century. Students completing this degree will find themselves in the very forefront of biology in the 21<sup>st</sup> 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 within the program. 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 Department of Plant and Wildlife Sciences encourages student participation in active clubs within the department. Students are active participants in professional societies; national honor societies; campus academic, service, and social clubs.

**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 students seeking employment in the biotech industry:  
PWS 199R  
GE courses for bio-business students seeking a Marriot School of Management minor:  
Stat 121  
Econ 110

**\*\*Careers in Genetics & Biotechnology, Fall of Sophomore year for all non-premed/predent students**

**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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