

# BS in Bioinformatics (282021) MAP Sheet

Life Sciences, 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>FRESHMAN YEAR</b>			
<b>Requirements</b>	<b>#Classes</b>	<b>Hours</b>	<b>Classes</b>	<b>1st Semester</b>		<b>JUNIOR YEAR</b>	
<b>Religion Cornerstones</b>				First-year Writing or American Heritage	3.0	<b>5th Semester</b>	
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	C S 142	3.0	C S 240	4.0
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	BIO 130	4.0	STAT 151 or 201	3.0
Foundations of the Restoration	1	2.0	REL C 225	Quantitative Reasoning	3.0	General electives	4.0
The Eternal Family	1	2.0	REL C 200	Religion Cornerstone course	2.0	Religion Elective	2.0
<b>The Individual and Society</b>				<b>Total Hours</b>	<b>15.0</b>	<b>Total Hours</b>	<b>16.0</b>
American Heritage	1-2	3-6.0	from approved list	<b>2nd Semester</b>		<b>6th Semester</b>	
Global and Cultural Awareness	1	3.0	from approved list	BIO 165	3.0	C S 312	3.0
<b>Skills</b>				MATH 112	4.0	Adv. Written and Oral Communication	3.0
First Year Writing	1	3.0	from approved list	A HTG or First-Year Writing	3.0	General elective	3.0
Advanced Written and Oral Communications	1	3.0	from approved list	CHEM 105	4.0	Religion elective	2.0
Quantitative Reasoning	1	3-4.0	from approved list	Religion Cornerstone course	2.0	Arts or Letters elective	3.0
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*	<b>Total Hours</b>	<b>16.0</b>	<b>Total Hours</b>	<b>14.0</b>
<b>Arts, Letters, and Sciences</b>				<b>SOPHOMORE YEAR</b>		<b>SENIOR YEAR</b>	
Civilization 1	1	3.0	from approved list	<b>3rd Semester</b>		<b>7th Semester</b>	
Civilization 2	1	3.0	from approved list	CS 235	3.0	BIO 365	3.0
Arts	1	3.0	from approved list	MMBIO 240	3.0	Major elective	4.0
Letters	1	3.0	from approved list	General Elective	7.0	Civilization 1 elective	3.0
Biological Science	1	4.0	BIO 130*	Religion Cornerstone course	2.0	Religion elective	2.0
Physical Science	2	7.0	CHEM 105* plus one course from approved list	<b>Total Hours</b>	<b>15.0</b>	Physical Science elective	3.0
Social Science	1	3.0	from approved list	<b>4th Semester</b>		<b>Total Hours</b>	<b>15.0</b>
<b>Core Enrichment: Electives</b>				CHEM 106	3.0	<b>8th Semester</b>	
Religion Electives	3-4	6.0	from approved list	C S 236	3.0	BIO 420	2.0
Open Electives	Variable	Variable	personal choice	PWS 340	3.0	BIO 465	3.0
*THESE CLASSES FULL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (12 hours overlap)				Global & Cultural Awareness	3.0	Major electives	5.0
<b>Graduation Requirements:</b>				Religion Cornerstone course	2.0	Social Science elective	3.0
Minimum residence hours required		30.0		<b>Total Hours</b>	<b>14.0</b>	Civilization 2 elective	3.0
Minimum hours needed to graduate		120.0				<b>Total Hours</b>	<b>16.0</b>

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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### 2018-2019 Program Requirements (60 Credit Hours)

<p><b>REQUIREMENT 1</b> Complete 7 courses</p> <p>*BIO 130 - Biology 4.0</p> <p>BIO 165 - Introduction to Bioinformatics 3.0</p> <p>BIO 250 - Evolutionary Medicine 2.0</p> <p>BIO 365 - Computational Biology 3.0</p> <p>BIO 465 - Capstone in Bioinformatics 3.0</p> <p>MMBIO 240 - Molecular Biology 3.0</p> <p>PWS 340 - Genetics 3.0</p> <p><b>REQUIREMENT 2</b> Complete 8 courses</p> <p>C S 142 - Introduction to Computer Programming 3.0</p> <p>C S 235 - Data Structures and Algorithms 3.0</p> <p>C S 236 - Discrete Structures 3.0</p> <p>C S 240 - Advanced Programming Concepts 4.0</p> <p>C S 312 - Algorithm Design and Analysis 3.0</p> <p>CHEM 105 - General College Chemistry 1 with Lab (Integrated) 4.0</p> <p>CHEM 106 - General College Chemistry 2 3.0</p> <p>MATH 112 - Calculus 1 4.0</p> <p><b>REQUIREMENT 3</b> Complete 12.0 hours from the following course(s)</p> <p>BIO 194 - Introduction to Mentored Research 0.5</p> <p>BIO 370 - Bioethics 2.0</p> <p>BIO 463 - Genetics of Human Disease 3.0</p> <p>BIO 468 - (Bio-MMBio-PWS) Genomics 3.0</p> <p>BIO 494R - Mentored Research 6.0v</p> <p><i>You may take up to 2 credit hours.</i></p> <p>BIO 555 - Evolutionary and Ecological Modeling 2.0</p> <p>BIO 560 - Population Genetics 4.0</p> <p>C S 340 - Software Design and Testing 3.0</p> <p>C S 418 - Bioinformatics 3.0</p> <p>C S 450 - Computer Vision 3.0</p> <p>C S 452 - Database Modeling Concepts 3.0</p> <p>C S 470 - Introduction to Artificial Intelligence 3.0</p> <p>C S 478 - Tools for Machine Learning 3.0</p> <p>C S 484 - Parallel Processing 3.0</p> <p>CHEM 351 - Organic Chemistry 1 3.0</p> <p>CHEM 352 - Organic Chemistry 2 3.0</p> <p>CHEM 353 - Organic Chemistry Laboratory--Nonmajors 2.0v</p> <p>CHEM 481 - Biochemistry 3.0</p> <p>CHEM 482 - Mechanisms of Molecular Biology 3.0</p> <p>CHEM 489 - Structural Biochemistry 3.0</p> <p>CHEM 584 - Advanced Biochemistry Methods 1 3.0</p>	<p>CHEM 586 - Advanced Biochemistry Methods 2 3.0</p> <p>MATH 113 - Calculus 2 4.0</p> <p>MATH 313 - Elementary Linear Algebra 3.0</p> <p>MATH 334 - Ordinary Differential Equations 3.0</p> <p>MATH 410 - Introduction to Numerical Methods 3.0</p> <p>MATH 411 - Numerical Methods 3.0</p> <p>MATH 431 - Probability Theory 3.0</p> <p>MATH 450 - Combinatorics 3.0</p> <p>MMBIO 360 - Microbial Genetics 4.0</p> <p>MMBIO 465 - Virology 3.0</p> <p>PDBIO 360 - Cell Biology 3.0</p> <p>PDBIO 362 - Advanced Physiology 3.0</p> <p>PDBIO 382 - Developmental Biology 3.0</p> <p>PDBIO 582 - Developmental Genetics 3.0</p> <p>STAT 381 - Statistical Computing 3.0</p> <p>STAT 435 - Nonparametric Statistical Methods 3.0</p> <p>STAT 531 - Experimental Design 3.0</p> <p><b>THE DISCIPLINE:</b></p> <p>Bioinformatics is an interdisciplinary program offering substantial training in both the biological sciences and the physical and mathematical sciences with an emphasis on computer programming coupled with genetics and molecular biology. Students are expected to acquire programming, databasing, and operating system skills coupled with a foundation in mathematics and statistics. In addition, students will be well trained in molecular biology and genetics and can pursue individual interests in a variety of areas (chemistry, physics, bioengineering, computer science, molecular biology, genetics, etc.).</p> <p><b>RESEARCH OPPORTUNITIES:</b></p> <p>Undergraduates majoring in bioinformatics are expected to participate in research training both on and off campus. The bioinformatics faculty has substantial research programs in phylogenetics, biophysics, ecological modeling, and proteomics with developing programs in biodiversity informatics and biotechnology/agricultural genomics. Students are encouraged to participate in one of these bioinformatic research programs.</p>	<p>For a further description of research opportunities and research groups on campus see our website at <a href="http://bioinformatics.byu.edu">http://bioinformatics.byu.edu</a>.</p> <p><b>INTERNSHIPS, CO-OP ED, PRACTICAL EXPERIENCE:</b></p> <p>The bioinformatics major offers an abundance of internship opportunities off campus in addition to working with faculty on campus as described above. Students have worked at federal research labs (NIH, NCBI, NCI), at other universities, and at private biotech and pharmaceutical companies seeking summer interns in bioinformatics. The bioinformatics major offers placement assistance for such programs and encourages students to gain a variety of external research experiences.</p> <p><b>CAREERS:</b></p> <p>The bioinformatics major is designed to develop the skills of those students with interests in both computer science and the biological sciences and to merge these interests in the area of bioinformatics or computational biology. The breadth of skills acquired will provide students with exciting options from graduate school, professional school (medical, dental, law), to employment opportunities directly out of this undergraduate program, especially with biotechnology companies.</p> <p><b>FINANCING:</b></p> <p>Students in this major may apply for university, college, and department scholarships. A limited number of research or teaching assistant positions for undergraduate students also exist.</p> <p><b>MAP DISCLAIMER</b></p> <p>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.</p> <p><b>DEPARTMENT INFORMATION</b></p>
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## **BS in Bioinformatics (282021)**

**2018-2019**

### **Department of Biology**

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### **ADVISEMENT CENTER INFORMATION**

#### **Life Sciences Advisement**

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