



BS in BIOINFORMATICS (282021) MAP Sheet

Department of Biology

For students entering the degree program during the 2015–2016 curricular year.

UNIVERSITY CORE AND GRADUATION REQUIREMENTS				PROGRAM REQUIREMENTS (60 total hours)		
UNIVERSITY CORE REQUIREMENTS				Complete the following:		
<u>Requirements</u>	<u>#Classes</u>	<u>Hours</u>	<u>Classes</u>	Bio 130*	Biology	4.0
Religion Cornerstones				Bio 165	Introduction to Bioinformatics	3.0
Teachings & Doctrine, Book of Mormon	1	2.0	Rel A 275	Bio 420	Evolutionary Biology	2.0
Jesus Christ & the Everlasting Gospel	1	2.0	Rel A 250	Bio 465	Bioinformatics	3.0
Foundations of the Restoration	1	2.0	Rel C 225	MMBio 240	Molecular Biology	3.0
The Eternal Family	1	2.0	Rel C 200	PWS 340	Genetics	3.0
The Individual and Society				Complete one course from the following:		
Citizenship				Bio 365	Computational Biology	3.0
American Heritage	1–2	3–6.0	from approved list	C S 418	Bioinformatics	3.0
Global & Cultural Awareness	1	3.0	from approved list	Complete the following:		
Skills				C S 142	Intro to Computer Programming	3.0
Effective Communication				C S 235	Data Structures & Algorithms	3.0
First-Year Writing	1	3.0	from approved list	C S 236	Discrete Structures	3.0
Adv Written & Oral Communication	1	3.0	Engl 316	C S 240	Adv. Programming Concepts	4.0
Quantitative Reasoning	0–1	0–3.0	from approved list	C S 312	Algorithm Design & Analysis	3.0
Languages of Learning (Math or Language)	1	4.0	Math 112* or 113*	Chem 105*	General College Chemistry	4.0
Arts, Letters, and Sciences				Chem 106	General College Chemistry	3.0
Civilization 1 and 2	2	6.0	from approved list	Math 112*	Calculus 1	4.0
Arts	1	3.0	from approved list	Complete one course from the following:		
Letters	1	3.0	from approved list	Stat 151	Introduction to Bayesian Statistics	3.0
Scientific Principles & Reasoning				Stat 201	Statistics for Engineers & Scientists	3.0
Biological Science	1	4.0	Bio 130*	Complete 9 hours from the following upper-division electives in computer science, chemistry, mathematics, statistics, or biology:		
Physical Science	2	7.0	Chem 105* plus one course from approved list	Bio 370	Bioethics	2.0
Social Science	1	3.0	from approved list	Bio 421	Evolutionary Biology Laboratory	1.0
Core Enrichment: Electives				Bio 450	Conservation Biology	3.0
Religion Electives	3–4	6.0	from approved list	Bio 463	Genetics of Human Disease	3.0
Open Electives	Variable	Variable	personal choice	Bio 468	Genomics	3.0
				Bio 494R	Mentored Research	6.0V
				(Up to 2 credit hours allowed)		
				Bio 555	Evolutionary & Ecological Modeling	2.0
				Bio 560	Population Genetics	4.0
				C S 340	Software Design & Testing	3.0
				C S 360	Internet Programming	3.0
				C S 450	Intro to Digital Signal & Image Proc	3.0
				C S 452	Database Modeling Concepts	3.0
				C S 470	Intro to Artificial Intelligence	3.0
				C S 478	Tools for Machine Learning & Data Mining	3.0
				C S 484	Parallel Processing	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
				Chem 489	Structural Biochemistry	3.0
				Chem 584	Biochemistry Laboratory/Proteins	3.0
				Chem 586	Biochemistry Laboratory/Nucleic Acids	3.0
				Math 113	Calculus 2	4.0
				Math 313	Elementary Linear Algebra	3.0
				Math 334	Ordinary Differential Equations	3.0
				Math 410	Intro to Numerical Methods	3.0
				Math 411	Numerical Methods	3.0
				Math 431	Probability Theory	3.0
				Math 450	Combinatorics	3.0
				MMBio 360	Microbial Genetics	4.0
				MMBio 465	Virology	3.0
				PDBio 360	Cell Biology	3.0
				PDBio 362	Advanced Physiology	3.0
				PDBio 482	Developmental Biology	3.0
				PDBio 582	Developmental Genetics	3.0
				Stat 424	Statistical Computing	3.0
				Stat 431	Experimental Design	3.0
				Stat 435	Nonparametric Statistical Methods	3.0
GRADUATION REQUIREMENTS:						
Minimum residence hours required		30.0				
Minimum hours needed to graduate		120.0				

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

*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (12 hours overlap)

BS in BIOINFORMATICS (282021)
2015–2016

Suggested Sequence of Courses:

FRESHMAN YEAR

<u>1st Semester</u>	
Bio 130 (FW) (Biological Science)	4.0
C S 142 (FWSpSu)	3.0
First-Year Writing	3.0
or A Htg 100 (FWSpSu)	(3.0)
Quantitative Reasoning	0–3.0
(If needed)	
Religion Cornerstone course	2.0
Total Hours	12–15.0

2nd Semester

Bio 165 (W)	3.0
Math 112 (FWSpSu)	4.0
A Htg 100 (FWSpSu)	3.0
or First-Year Writing	(3.0)
Chem 105	4.0
Religion Cornerstone course	2.0
Total Hours	15.0

SOPHOMORE YEAR

<u>3rd Semester</u>	
Chem 105 (FWSp)	4.0
CS 235	3.0
MMBio 240 (FWSp)	3.0
General elective	3.0
Religion Cornerstone course	2.0
Total Hours	15.0

4th Semester

Chem 106 (FWSp)	3.0
C S 236	3.0
PWS 340 (FWSp)	3.0
Global & Cultural Awareness	3.0
Religion Cornerstone course	2.0
Total Hours	14.0

JUNIOR YEAR

<u>5th Semester</u>	
C S 240	3.0
Stat 151 or 201	3.0
General electives	5.0
Religion elective	2.0
Arts or Letters elective	3.0
Total Hours	16.0

6th Semester

C S 312	3.0
Adv. Written & Oral Communication	3.0
Major elective	3.0
Religion elective	2.0
Arts or Letters elective	3.0
Total Hours	14.0

SENIOR YEAR

<u>7th Semester</u>	
Bio 365 (F)	3.0
Major elective	4.0
Civilization 1 elective	3.0
Religion elective	2.0
Physical Science elective	3.0
Total Hours	15.0

8th Semester

Bio 420 (FWSp)	2.0
Bio 465 (W)	3.0
Major electives	5.0
Social Science elective	3.0
Civilization 2 elective	3.0
Total Hours	16.0

THE DISCIPLINE:

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.).

RESEARCH OPPORTUNITIES:

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. For a further description of research opportunities and research groups on campus see our website at <http://bioinformatics.byu.edu>

INTERNSHIPS, CO-OP ED, PRACTICAL EXPERIENCE:

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.

CAREERS:

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.

FINANCING:

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.

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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