Bioinformatics, B.S.

Bioinformatics is the fastest growing field in Biology. In general terms, bioinformatics is the synthesis of computational methods and biological systems and comprises many sub-fields that approach different questions in biology. A Bachelor of Science in Bioinformatics will prepare students to enter a variety of fields such as: medical informatics and interventions, new agricultural paradigms, pharmaceutical discovery, and molecular genealogy predictions, among others. This degree would provide students with the knowledge, skills, and experience to be competitive for both graduate school and employment opportunities.

Matriculation Requirements

BIOL 1610 College Biology I BB with C- or higher,

CS 1400 Fundamentals of Programming with a C+ or higher, and

Approval of Biology Department or Computer Science Department advisor.

Program Requirements

Code	Title	Credit Hours
Total Credit Hours		**120**
General Education Requirements:		**39 Credits**
ENGL 1010	Introduction to Academic Writing CC	3
or ENGH 1005	Literacies and Composition Across Contexts CC	
ENGL 2010	Intermediate Academic Writing CC	3
MATH 1050	College Algebra QL	4
or MATH 1055	College Algebra with Preliminaries QL	
Complete one of the following:		3
HIST 2700 & HIST 2710	US History to 1877 AS and US History since 1877 AS (6)	
HIST 1700	American Civilization AS (3)	
HIST 1740	US Economic History AS (3)	
POLS 1000	American Heritage AS (3)	
POLS 1100	American National Government AS (3)	
Complete the following:		
PHIL 2050	Ethics and Values IH	3
or PHIL 205G	Ethics and Values IH GI	
HLTH 1100	Personal Health and Wellness TE	2
or EXSC 1097	Fitness for Life TE	
Distribution Courses:		
BIOL 1610	College Biology I BB	4
CHEM 1210	Principles of Chemistry I PP	4
CHEM 1220	Principles of Chemistry II PP	4
Humanities Distribution		3
Fine Arts Distribution		3
Social/Behavioral Science		3
Discipline Core Requirements		**50 Credits**
BIOL 1011	Introduction to Bioinformatics BB	3
BIOL 1615	College Biology I Laboratory	1
BIOL 3500	Genetics	3
BIOL 3550	Molecular Biology	3
BIOL 3100	Introduction to Data Analysis for Biologists	3
BIOL 492R	Professional Development	1
BIOL 497R	Biology Colloquium (0.5 cr, two required))	1

BIOL 4940	Student Seminar WE	2
BIOL 4550	Molecular Evolution and Bioinformatics WE	3
BIOL 4600	Bioinformatics Capstone	3
STAT 2040	Principles of Statistics QL	4
CHEM 1215	Principles of Chemistry I Laboratory	1
CHEM 1225	Principles of Chemistry II Laboratory	1
CS 1400	Fundamentals of Programming	3
CS 1410	Object Oriented Programming	3
CS 2300	Discrete Mathematical Structures I	3
CS 2420	Introduction to Algorithms and Data Structures	3
CS 305G	Global Social and Ethical Issues in Computing GI WE	3
INFO 2410	Database Fundamentals	3
IT 1510	Introduction to System Administration--Linux/UNIX	3
Elective Requirements		**31 Credits**
Choose 6 credits from any general electives. [1]		6
Choose 25 credits from list below or approved by advisor		25
BIOL 3150	Bioinformatics Data Skills (3)	
BIOL 3700	General Ecology (3)	
BIOL 4300	Bioinformatics and Genome Analysis (4)	
BIOL 4400	Genomics (3)	
BIOL 4500	Principles of Evolution WE (3)	
BIOL 489R	Student Research (1-9)	
BIOL 490R	Special Topics in Biology (1-4)	
BIOL 499R	Senior Thesis (1-2)	
MICR 2060	Microbiology for Health Professions BB (3)	
MICR 3200	Emerging and Re Emerging Diseases and Zoonoses (3)	
MICR 3450	General Microbiology (3)	
CS 3270	Python Software Development (3)	
CS 3320	Numerical Software Development (3)	
CS 3520	Database Theory (3)	
CS 3530	Data Management For Data Sciences (3)	
STAT 4100	Design of Experiment (3)	
STAT 4400	Multivariate Analysis WE (3)	
STAT 4710	Mathematical Statistics-Probability and Statistics (3)	
STAT 4720	Mathematical Statistics-Statistical Inference (3)	
MATH 1210	Calculus I QL (4)	
or MATH 121H	Calculus I QL	
MATH 1220	Calculus II (4)	
or MATH 122H	Calculus II	
MATH 2270	Linear Algebra (3)	
MATH 2210	Calculus III (4)	
or MATH 221H	Calculus III	

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Upper division is suggested to meet upper division requirements

Graduation Requirements

1. Complete the required minimum credit hours.
2. If an AA or AS degree has been earned, a maximum of 64 of these credits may apply toward the BS.
3. At least 30 credit hours in residence at UVU or satellite sites are required, with 10 hours earned during the last 45 hours.
4. A minimum of 40 credits must be upper-division (numbered 3000 or above).
5. A minimum of 40 credits must be in the major, 30 of which must be upper-division. A minimum of nine Department credits must be taken at UVU.

6. Except for 490R Special Topics courses, a maximum cumulative total of 9 credits in any combination of upper division Departmental courses with an "R" designation may count toward graduation.
7. Complete Biology Department core courses with a grade of "C-" or higher in each course.
8. Achieve a minimum overall GPA of 2.0 with a minimum GPA of 2.25 in biology department courses.
9. Complete the appropriate application for graduation form.
10. Successful completion of at least one Global/Intercultural course.
11. Successful completion of at least two Writing Enriched (WE) courses.

Graduation Plan

This graduation plan is a sample plan and is intended to be a guide. Your specific plan may differ based on your Math and English placement and/or transfer credits applied. You are encouraged to meet with an advisor and set up an individualized graduation plan in Wolverine Track (http://www.uvu.edu/wolverinetrack/).

First Year		
Semester 1		**Credit Hours**
ENGL 1010	Introduction to Academic Writing CC	3
MATH 1050 or MATH 1055	College Algebra QL or College Algebra with Preliminaries QL	4
CHEM 1210	Principles of Chemistry I PP	4
CHEM 1215	Principles of Chemistry I Laboratory	1
BIOL 1011	Introduction to Bioinformatics BB	3
	Credit Hours	**15**
Semester 2		
ENGL 2010	Intermediate Academic Writing CC	3
BIOL 1610	College Biology I BB	4
BIOL 1615	College Biology I Laboratory	1
CS 1400	Fundamentals of Programming	3
CHEM 1220	Principles of Chemistry II PP	4
CHEM 1225	Principles of Chemistry II Laboratory	1
	Credit Hours	**16**
Second Year		
Semester 3		
American Institutions		3
Fine Arts Distribution		3
CS 1410	Object Oriented Programming	3
IT 1510	Introduction to System Administration--Linux/UNIX	3
BIOL 3500	Genetics	3
	Credit Hours	**15**
Semester 4		
HLTH 1100 or EXSC 1097	Personal Health and Wellness TE or Fitness for Life TE	2
CS 2300	Discrete Mathematical Structures I	3
BIOL 3550	Molecular Biology	3
Humanities Distribution		3
INFO 2410	Database Fundamentals	3
BIOL 497R	Biology Colloquium	0.5
	Credit Hours	**14.5**
Third Year		
Semester 5		
PHIL 2050	Ethics and Values IH	3
CS 2420	Introduction to Algorithms and Data Structures	3
STAT 2040	Principles of Statistics QL	4
General Elective		3
Upper Division Elective		2
	Credit Hours	**15**
Semester 6		
Social/Behavioral Science Distribution		3
BIOL 3100	Introduction to Data Analysis for Biologists	3
General Elective		3
Upper Division Elective		6
	Credit Hours	**15**

Fourth Year		
Semester 7		
BIOL 497R	Biology Colloquium	0.5
BIOL 4940	Student Seminar WE	2
BIOL 4550	Molecular Evolution and Bioinformatics WE	3
Upper Division Elective		9
	Credit Hours	**14.5**
Semester 8		
BIOL 4600	Bioinformatics Capstone	3
CS 305G	Global Social and Ethical Issues in Computing GI WE	3
BIOL 492R	Professional Development	1
Upper Division Elective		8
	Credit Hours	**15**
	Total Credit Hours	**120**

Program Learning Outcomes

1. Demonstrate mastery of the core concepts of bioinformatics as derived from the associated fields of biology, computer science, mathematics, informatics, and chemistry.
2. Utilize existing software to extract, compile, and analyze information from large databases.
3. Create data science pipelines and/or computer programs that facilitate biological data analysis.
4. Analyze a novel biological dataset as part of a project using bioinformatic approaches.
5. Present a bioinformatics project either orally or as a written paper.