

# Bioinformatics, BS

## Program Description

The BS in Bioinformatics Degree is designed for students interested in the interdisciplinary fields of Biology, Chemistry, Mathematics, and Computer Science. Students will have the opportunity to develop methods and software tools for understanding and analyzing biological data and to apply it to medical research.

## Program Curriculum

120 credits

### Utah Tech General Education Requirements

All Utah Tech General Education requirements must be fulfilled. A previously earned degree may fulfill those requirements, but courses must be equivalent to Utah Tech's minimum General Education standards in American Institutions, English, and Mathematics.

Code	Title	Hours
General Education Core Requirements ( <a href="http://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext">catalog.utahtech.edu/programs/generaleducation/#gerequirementstext</a> )		
English		3-7
Mathematics		3-5
American Institutions		3-6
Life Sciences		3-10
Physical Sciences		3-5
Laboratory Science		0-1
Fine Arts		3
Literature/Humanities		3
Social & Behavioral Sciences		3
Exploration		3-5

### Bioinformatics Core Requirements

Complete the following 65 credits of Program Core Requirements

Code	Title	Hours
BIOL 1610 & BIOL 1615	Principles of Biology I (LS) and Principles of Biology I Lab (LAB) <sup>1</sup>	5
BIOL 1620 & BIOL 1625	Principles of Biology II and Principles of Biology II Lab	5
BIOL 2035	Principles of Genetics Laboratory	1
BIOL 3030	Principles of Genetics	4
BIOL 3300	Introduction to Bioinformatics	3
BIOL 4300 & BIOL 4305	Molecular Biology and Molecular Biology Laboratory	4
BIOL 4310	Advanced Bioinformatics	3
BIOL 4810R	Independent Research	1
BIOL 4910	Senior Seminar	1
CHEM 1210 & CHEM 1215	Principles of Chemistry I (PS) and Principles of Chemistry I Lab (LAB) <sup>1</sup>	5
CHEM 1220 & CHEM 1225	Principles of Chemistry II and Principles of Chemistry II Lab	5
CS 1400	Fundamentals of Programming	3
CS 1410	Object Oriented Programming	3
CS 2420	Introduction to Algorithms and Data Structures	3
CS 2450	Software Engineering	3
CS 3310	Discrete Mathematics	3
IT 1100	Introduction to Unix/Linux	3

IT 2300	Database Design & Management	3
MATH 1210	Calculus I (MA) <sup>1</sup>	4
MATH 3060	Statistics for Scientists	3

<sup>1</sup> Course may be used to meet both Bioinformatics Core and General Education requirements.

## Bioinformatics Program elective courses

Complete a total of 18 credits from the following list of approved Program Elective courses

Code	Title	Hours
BIOL 3010	Evolution	3
BIOL 3040	General Ecology	3
BIOL 3100	Bioethics	3
BIOL 3250	Cancer Biology	3
BIOL 3450 & BIOL 3455	General Microbiology and General Microbiology Lab	4
BIOL 3550 & BIOL 3555	Eukaryotic Cell Biology and Eukaryotic Cell Biology Lab	4
BIOL 4810R	Independent Research	1-6
BIOL 4890R	Life Science Internship	1-8
BIOL 4930R	Senior Thesis	1-4
CHEM 2310 & CHEM 2315	Organic Chemistry I and Organic Chemistry I Lab	5
CHEM 2320 & CHEM 2325	Organic Chemistry II and Organic Chemistry II Lab	5
CHEM 3510 & CHEM 3515	Biochemistry I and Biochemistry I Lab	4
CHEM 3520 & CHEM 3525	Biochemistry II and Biochemistry II Lab	4
CS 3005	Programming in C++	3
CS 3200	Web Application Development I	3
CS 3510	Algorithms	3
CS 4300	Artificial Intelligence	3
CS 4307	Database Systems	3
CS 4320	Machine Learning	3
SE 3100	Software Practices	3
SE 3150	Software quality	3
MATH 1220	Calculus II (MA)	4
MATH 2270	Linear Algebra	3
MATH 2280	Ordinary Differential Equations	3
MATH 3400	Probability & Statistics	3
MATH 3500	Numerical Analysis	3

## BIOINFORMATICS PROGRAM ELECTIVE COURSES

Complete a total of 16 credits of general elective courses.

It is highly recommended that students complete one of the following certificates: Functional Genomics, Genetic Sequencing, Protein Characterization, Biological mathematical Modeling, Cell Culture.

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## Graduation Requirements

1. Complete a minimum of 120 college-level credits (1000 and above).
2. Complete at least 40 upper-division credits (3000 and above).
3. Complete at least 30 upper-division credits at Utah Tech for institutional residency, with at least 15 credits earned in the last 45 credits
4. Cumulative GPA 2.0 or higher.

5. Grade C or higher required in each of the Bioinformatics Core courses and Program Elective courses  
 6. Maximum 6 total credits of BIOL 4810R, and/or BIOL 4890R, and/or BIOL 4930R may be used toward Biology requirements.

## Graduation Plan

### 1st Year

Fall Semester	Hours	Spring Semester	Hours
BIOL 1610 & BIOL 1615		5 BIOL 1620 & BIOL 1625	5
ENGL 1010		3 ENGL 2010	3
CS 1400		3 CS 1410	3
General Education (Social & Behavioral Sciences) (catalog.utahtech.edu/ programs/generaleducation/ #gerequirementstext)		3 MATH 1210	4
		<b>14</b>	<b>15</b>

### 2nd Year

Fall Semester	Hours	Spring Semester	Hours
CHEM 1210 & CHEM 1215		5 CHEM 1220 & CHEM 1225	5
BIOL 2035		1 BIOL 3300	3
BIOL 3030		4 IT 1100	3
CS 2420		3 General Education (Literature/ Humanities) (catalog.utahtech.edu/ programs/generaleducation/ #gerequirementstext)	3
Elective		3	
		<b>16</b>	<b>14</b>

### 3rd Year

Fall Semester	Hours	Spring Semester	Hours
BIOL 4310		3 BIOL 4300 & BIOL 4305	4
MATH 3060		3 IT 2300	3
General Education (American Institutions) (catalog.utahtech.edu/ programs/generaleducation/ #gerequirementstext)		3 Elective Requirement	6
Elective Requirement		3 Elective	3
Elective		3	
		<b>15</b>	<b>16</b>

### 4th Year

Fall Semester	Hours	Spring Semester	Hours
BIOL 4810R		1 CS 2450	3
BIOL 4910		1 General Education (Exploration) (catalog.utahtech.edu/programs/ generaleducation/#gerequirementstext)	3
CS 3310		3 Elective Requirement	3
General Education (Fine Arts) (catalog.utahtech.edu/programs/ generaleducation/#gerequirementstext)		3 Elective	7
Elective Requirement		6	
		<b>14</b>	<b>16</b>

**Total Hours 120**

### Bioinformatics Program Learning Outcomes

At the successful conclusion of this program, students will be able to:

1. Outline the foundational concepts of biology, chemistry, computer science, and mathematics.
2. Create computational solutions to biological and biology-related research problems using interpreted and compiled programming languages, recognizing the need for continual learning and skill development.
3. Devise and understand the range of high-throughput, large-scale research projects in contemporary inquiry in biology and biology related fields.
4. Develop and apply algorithms and statistical strategies used in analysis of biological and biology-related research problems.