

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.

General Education Core Requirements (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)

Code	Title	Hours
English		3-7
Mathematics		3-5
American Institutions		3-6
Life Sciences		3-10
Physical Sciences		3-5
Fine Arts		3
Literature/Humanities		3
Social & Behavioral Sciences		3

Bioinformatics Core Requirements

Complete the following 68 credits of Program Core Requirements

Code	Title	Hours
BIOL 1610 & BIOL 1615	Principles of Biology I (LS) and Principles of Biology I Lab (LAB)	5
BIOL 1620 & BIOL 1625	Principles of Biology II and Principles of Biology II Lab	5
BIOL 3300	Introduction to Bioinformatics	3
BIOL 3030	Principles of Genetics	3
BIOL 3150	Biostatistics and the Scientific Method	3
BIOL 3155	Scientific Method and Experimental Design	1
BIOL 4010	Molecular Evolution	3
BIOL 4300 & BIOL 4305	Molecular Biology and Molecular Biology Laboratory	4
BIOL 4310	Advanced Bioinformatics	3
BIOL 4320	Scripting for Biologists	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)	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 2450	Software Engineering	3

CS 2100	Discrete Structures	3
IT 1100	Introduction to Unix/Linux	3
IT 2300	Database Design & Management	3
MATH 1210	Calculus I (MA) ¹	4
Pick one (1) of the following Technical Laboratory Course		
BTEC 2010	DNA Methods and Analysis	2
BTEC 2020	Protein Purification and Analysis	2
BTEC 2030	Cell Culture Techniques	2
BTEC 2050	Zebrafish Maintenance & Methodology	2
BIOL 2300	Fundamentals of Bioinformatics	2

¹ Course may be used to meet both Bioinformatics Core and General Education requirements.

Bioinformatics Program elective courses

Complete a total of 15 credits from the following list of approved Program Elective courses

Code	Title	Hours
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 3460	Biology of Infectious Disease	3
BIOL 3470	Introduction to Immunology	3
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 2450	Software Engineering	3
CS 3005	Programming in C++	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
Any BTEC 3000+		
A maximum of one of the following courses/course sets:		
BIOL 4200 & BIOL 4205	Plant Taxonomy (ALPP) and Plant Taxonomy Lab (ALPP)	4

BIOL 4260 & BIOL 4265	Herpetology and Herpetology Lab	3
BIOL 4270 & BIOL 4275	Ichthyology and Ichthyology Lab	3
BIOL 4280	Marine Biology	3
BIOL 4350 & BIOL 4355	Animal Behavior and Animal Behavior Lab	4
BIOL 4380 & BIOL 4385	Ornithology and Ornithology Lab	3
BIOL 4411 & BIOL 4415	Mammalogy and Mammalogy Lab	4
BIOL 4440 & BIOL 4445	General Entomology and General Entomology Lab	4

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.

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 BIOL 2300	2
SSC 1010	2 ENGL 2010	3
General Education (Social & Behavioral Sciences) (catalog.utahtech.edu/ programs/generaleducation/ #gerequirementstext)	3 MATH 1210	4
General Education (Fine Arts) (catalog.utahtech.edu/ programs/generaleducation/ #gerequirementstext)	3 General Elective	1
	16	15

2nd Year

Fall Semester	Hours Spring Semester	Hours
BIOL 3030	3 BIOL 3300	3
CHEM 1210 & CHEM 1215	5 CHEM 1220 & CHEM 1225	5
CS 1400	3 IT 1100	3

General Education (American Institutions) (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3 General Education (Literature/ Humanities) (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3
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14**14****3rd Year****Fall Semester****Hours Spring Semester****Hours**

BIOL 3150	3 BIOL 4300 & BIOL 4305	4
BIOL 3155	1 BIOL 4310	3
CS 1410	3 IT 2300	3
BIOL 4320	3 CS 2420	3
Program Elective	3 General Elective	3
General Elective	3	

16**16****4th Year****Fall Semester****Hours Spring Semester****Hours**

BIOL 4810R	1 Program Elective	3
BIOL 4010	3 Program Elective	3
BIOL 4910	1 Program Elective	4
CS 2100	3 General Elective	3
Program Elective	3 General Elective	3
General Elective	3	

14**16****Total Hours 121****BS Bioinformatics Program Learning Outcomes**

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

1. Outline the foundational concepts of biology including cellular, organismal, ecological, and evolutionary biology.
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 the analysis of biological and biology-related research problems.
5. Differentiate career opportunities within the field and explore career opportunities.