

# BS in Computer Science: Bioinformatics (693222) MAP Sheet

Physical and Mathematical Sciences, Computer Science

For students entering the degree program during the 2021-2022 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>JUNIOR YEAR</b>			
<b>Religion Cornerstones</b>				<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 312	3.0
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	First-year Writing or American Heritage	3.0	C S 324	3.0
Foundations of the Restoration	1	2.0	REL C 225	BIO 130	4.0	WRTG 316	3.0
The Eternal Family	1	2.0	REL C 200	MATH 112	4.0	MMBIO 240	3.0
<b>The Individual and Society</b>				Religion Cornerstone course	2.0	Religion Elective	2.0
American Heritage	1-2	3-6.0	from approved list	<b>Total Hours</b>	<b>16.0</b>	<b>Total Hours</b>	<b>14.0</b>
Global and Cultural Awareness	1	3.0	from approved list	<b>2nd Semester</b>			
<b>Skills</b>				First-year Writing or American Heritage	3.0	<b>6th Semester</b>	
First Year Writing	1	3.0	from approved list	C S 235	3.0	C S 340	3.0
Advanced Written and Oral Communications	1	3.0	WRTG 316*	STAT 121 or 201	3.0	C S 472	3.0
Quantitative Reasoning	1	4.0	MATH 112* or 113*	MATH 113	4.0	C S 404	2.0
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*	Religion Cornerstone course	2.0	PWS 340	3.0
<b>Arts, Letters, and Sciences</b>				<b>Total Hours</b>	<b>15.0</b>	Civilization 2 (letters)	3.0
Civilization 1	1	3.0	from approved list	<b>SOPHOMORE YEAR</b>			
Civilization 2	1	3.0	from approved list	<b>3rd Semester</b>			
Arts	1	3.0	from approved list	C S 236	3.0	<b>7th Semester</b>	
Letters	1	3.0	from approved list	Civilization 1	3.0	PHSCS 121	3.0
Biological Science	1	4.0	BIO 130*	C S 224	3.0	Computer Science Elective	3.0
Physical Science	2	7.0	CHEM 105* & PHSCS 121*	CHEM 105	4.0	Computer Science Elective	3.0
Social Science	1	3.0	from approved list	Religion Cornerstone course	2.0	BIO 365	3.0
<b>Core Enrichment: Electives</b>				<b>Total Hours</b>	<b>15.0</b>	Religion Elective	2.0
Religion Electives	3-4	6.0	from approved list	<b>4th Semester</b>			
Open Electives	Variable	Variable	personal choice	C S 240	4.0	<b>Total Hours</b>	<b>14.0</b>
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (18-22 hours overlap)				C S 252	3.0	<b>8th Semester</b>	
<b>Graduation Requirements:</b>				MATH 213	2.0	Computer Science Elective	3.0
Minimum residence hours required		30.0		MATH 215	1.0	Computer Science Elective	3.0
Minimum hours needed to graduate		120.0		Religion Cornerstone course	2.0	Global and Cultural Awareness	3.0
				Arts	3.0	BIO 465	3.0
				<b>Total Hours</b>	<b>15.0</b>	<b>Total Hours</b>	<b>15.0</b>

Note 1: The sequence of courses suggested may not fit the circumstances of every student. Students should contact their college advisement center for help in outlining an efficient schedule.

Note 2: 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.

FOR UNIVERSITY CORE OR PROGRAM QUESTIONS, CONTACT THE ADVISEMENT CENTER.

## BS in Computer Science: Bioinformatics (693222)

### 2021-2022 Program Requirements (88 Credit Hours)

*Personnel in the College of Physical and Mathematical Sciences Advisement Center will advise regarding core courses and suggested general education. Questions regarding curriculum and career decisions should be directed to the undergraduate advisor in the Computer Science Department.*

*Note: All hours of credit applied toward a major in computer science must be of C- or better and must be taken within eight years of declaring the computer science major. Any exceptions must be approved by the department. Students may choose to graduate under later requirements by updating their date of entry into the major at the college advisement center.*

**REQUIREMENT 1** Complete 11 courses

**CORE COURSES:**

C S 142 - Introduction to Computer Programming	3.0
C S 224 - Introduction to Computer Systems	3.0
C S 235 - Data Structures and Algorithms	3.0
C S 236 - Discrete Structures	3.0
C S 240 - Advanced Programming Concepts	4.0
C S 252 - Introduction to Computational Theory	3.0
C S 312 - Algorithm Design and Analysis	3.0
C S 324 - Systems Programming	3.0
C S 340 - Software Design	3.0
C S 404 - Ethics and Computers in Society	2.0
C S 472 - Introduction to Machine Learning	3.0

**REQUIREMENT 2** Complete 3 options

**SUPPORTING COURSES:**

**OPTION 2.1** Complete 10 courses

*BIO 130 - Biology	4.0
BIO 364 - Bioinformatics Algorithms	3.0
BIO 465 - Capstone in Bioinformatics	3.0
CHEM 105 - General College Chemistry 1 with Lab (Integrated)	4.0
MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
MMBIO 240 - Molecular Biology	3.0
PHSCS 121 - Introduction to Newtonian Mechanics	3.0
PWS 340 - Genetics	3.0
*WRTG 316 - Technical Communication	3.0

**OPTION 2.2** Complete 1 group

**GROUP 2.2.1** Complete 1 course

MATH 313 - (Not currently offered)

**GROUP 2.2.2** Complete 2 courses

MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0

**OPTION 2.3** Complete 1 course

STAT 121 - Principles of Statistics	3.0
STAT 201 - Statistics for Engineers and Scientists	3.0

**REQUIREMENT 3** Complete 15.0 hours from the following option(s)

**COMPLETE A TOTAL OF 5 ELECTIVE COURSES (15.0 CREDIT HOURS) FROM THE FOLLOWING OPTIONS. NOTE: IF C S 401R, 497R, OR 498R IS CHOSEN, IT MUST BE TAKEN FOR 3 HOURS.**

**OPTION 3.1** Complete up to 15.0 hours from the following course(s)

**COMPLETE 4-5 ELECTIVE COURSES (12-15 CREDIT HOURS) FROM THE FOLLOWING LIST:**

BIO 463 - Genetics of Human Disease	3.0
C S 180 - Introduction to Data Science	3.0
C S 260 - Web Programming	3.0
C S 329 - Testing, Analysis, and Verification	3.0
C S 330 - Concepts of Programming Languages	3.0
C S 345 - Operating Systems Design	3.0
C S 355 - Interactive Graphics and Image Processing	3.0
C S 356 - Designing the User Experience	3.0
C S 393 - Advanced Algorithms and Problem Solving	3.0
C S 401R - Topics in Computer Science	3.0v
<i>You may take up to 3 credit hours.</i>	
C S 405 - Creating and Managing a Software Business	3.0
C S 412 - Linear Programming and Convex Optimization	3.0
C S 428 - Software Engineering	3.0
C S 431 - Algorithmic Languages and Compilers	3.0
C S 450 - Computer Vision	3.0
C S 452 - Database Modeling Concepts	3.0
C S 453 - Fundamentals of Information Retrieval	3.0
C S 455 - Computer Graphics	3.0
C S 456 - Introduction to User Interface Software	3.0
C S 460 - Computer Communications and Networking	3.0
C S 462 - Large-Scale Distributed System Design	3.0
C S 465 - Computer Security	3.0
C S 470 - Introduction to Artificial Intelligence	3.0
C S 471 - Voice User Interfaces	3.0
C S 472 - Introduction to Machine Learning	3.0
C S 474 - Introduction to Deep Learning	3.0

C S 479 - (Not currently offered)	
C S 486 - Verification and Validation	3.0
C S 513 - Robust Control	3.0

**OPTION 3.2** Complete up to 6.0 hours from the following course(s)

**COMPLETE 0-2 ELECTIVE COURSES (0-6.0 CREDIT HOURS) FROM THE FOLLOWING LIST:**

C S 480 - Software Engineering Capstone 1	3.0
C S 481 - Software Engineering Capstone 2	3.0
C S 482 - Data Science Capstone 1	3.0
C S 483 - Data Science Capstone 2	3.0
C S 493R - Computing Competitions	3.0
<i>You may take up to 3 credit hours.</i>	
C S 494 - Capstone 1	3.0
C S 495 - Capstone 2	3.0
C S 497R - Undergraduate Research	3.0
<i>You may take up to 6 credit hours.</i>	
C S 498R - Undergraduate Special Projects	3.0v
<i>You may take up to 3 credit hours.</i>	

**REQUIREMENT 4**

Complete Senior Exit Interview with the CS department during your last semester or term.

**THE DISCIPLINE**

Computer science touches virtually every area of human endeavor. Software is responsible for everything from the control of kitchen appliances to sophisticated climate models used in predicting future environmental change. Students in computer science learn to approach complex problems in business, science, and entertainment using their strong background in mathematics, algorithms, and data structures.

The degree programs in the Computer Science Department prepare students to be confident software developers and technical problem solvers. The curriculum also trains students for research into new avenues where computers will have a significant impact.

The BS curriculum is accredited by the Computing Accreditation Commission of ABET.

## **BS in Computer Science: Bioinformatics (693222)**

**2021-2022**

### **CAREER OPPORTUNITIES**

Graduates pursue exciting opportunities in graphics, artificial intelligence, software engineering, database design, scientific programming, systems administration, and research at universities and national laboratories.

Students completing the animation emphasis will be prepared for technical positions at animation and game programming studios. Students will learn both the technical and artistic side of creating and implementing digital animations and games.

The bioinformatics emphasis is designed for students who are interested in building software to assist in analyzing biological systems. Students will graduate with a significant background in biology coupled with the software development and analysis skills necessary to implement large bioinformatics applications.

### **MAP DISCLAIMER**

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.

### **DEPARTMENT INFORMATION**

#### **Computer Science Department**

Brigham Young University  
3361 Talmage Building  
Provo, UT 84602  
Telephone: (801) 422-3027

### **ADVISEMENT CENTER INFORMATION**

#### **Physical and Mathematical Sciences College Advisement Center**

Brigham Young University  
N-181 ESC  
Provo, UT 84602  
Telephone: (801) 422-2674