

BS in Computer Science: Bioinformatics (693222) MAP Sheet

Physical and Mathematical Sciences, Computer Science

For students entering the degree program during the 2022-2023 curricular year.



University Core and Graduation Requirements	Suggested Sequence of Courses	
University Core Requirements:		
Requirements	#Classes	Hours
Religion Cornerstones		Classes
Teachings and Doctrine of The Book of Mormon	1	2.0 REL A 275
Jesus Christ and the Everlasting Gospel	1	2.0 REL A 250
Foundations of the Restoration	1	2.0 REL C 225
The Eternal Family	1	2.0 REL C 200
The Individual and Society		
American Heritage	1-2	3-6.0 from approved list
Global and Cultural Awareness	1	3.0 from approved list
Skills		
First Year Writing	1	3.0 from approved list
Advanced Written and Oral Communications	1	3.0 WRTG 316*
Quantitative Reasoning	1	4.0 MATH 112* or 113*
Languages of Learning (Math or Language)	1	4.0 MATH 112* or 113*
Arts, Letters, and Sciences		
Civilization 1	1	3.0 from approved list
Civilization 2	1	3.0 from approved list
Arts	1	3.0 from approved list
Letters	1	3.0 from approved list
Biological Science	1	4.0 BIO 130*
Physical Science	2	7.0 CHEM 105* & PHSCS 121*
Social Science	1	3.0 from approved list
Core Enrichment: Electives		
Religion Electives	3-4	6.0 from approved list
Open Electives	Variable	Variable personal choice
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (18-22 hours overlap)		
Graduation Requirements:		
Minimum residence hours required		30.0
Minimum hours needed to graduate		120.0
<p>FRESHMAN YEAR</p> <p><u>1st Semester</u></p> <p>C S 111 3.0</p> <p>First-year Writing or American Heritage 3.0</p> <p>BIO 130 4.0</p> <p>MATH 112 4.0</p> <p>Religion Cornerstone course 2.0</p> <p>Total Hours 16.0</p> <p><u>2nd Semester</u></p> <p>First-year Writing or American Heritage 3.0</p> <p>C S 235 3.0</p> <p>BIO 165 3.0</p> <p>MATH 113 4.0</p> <p>Religion Cornerstone course 2.0</p> <p>Total Hours 15.0</p> <p>SOPHOMORE YEAR</p> <p><u>3rd Semester</u></p> <p>C S 236 3.0</p> <p>Civilization 1 3.0</p> <p>C S 224 3.0</p> <p>CHEM 105 4.0</p> <p>Religion Cornerstone course 2.0</p> <p>Total Hours 15.0</p> <p><u>4th Semester</u></p> <p>C S 240 4.0</p> <p>BIO 264 3.0</p> <p>MATH 213 2.0</p> <p>MATH 215 1.0</p> <p>Religion Cornerstone course 2.0</p> <p>Arts 3.0</p> <p>Total Hours 15.0</p> <p>JUNIOR YEAR</p> <p><u>5th Semester</u></p> <p>C S 312 3.0</p> <p>C S 324 3.0</p> <p>WRTG 316 3.0</p> <p>MMBIO 240 3.0</p> <p>Religion Elective 2.0</p> <p>Total Hours 14.0</p> <p><u>6th Semester</u></p> <p>C S Elective 3.0</p> <p>C S 472 or 474 3.0</p> <p>C S 404 2.0</p> <p>PWS 340 3.0</p> <p>Civilization 2 (letters) 3.0</p> <p>Religion Elective 2.0</p> <p>Total Hours 16.0</p> <p>SENIOR YEAR</p> <p><u>7th Semester</u></p> <p>BIO 250 or BIO 420 2.0-4.0</p> <p>Computer Science Elective 3.0</p> <p>General Elective 3.0</p> <p>BIO 364 3.0</p> <p>Religion Elective 2.0</p> <p>Total Hours 13.0-15.0</p> <p><u>8th Semester</u></p> <p>Computer Science Elective 3.0</p> <p>Computer Science Elective 3.0</p> <p>General Elective 3.0</p> <p>Global and Cultural Awareness 3.0</p> <p>BIO 465 3.0</p> <p>Total Hours 15.0</p>		
<p>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.</p> <p>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.</p> <p>FOR UNIVERSITY CORE OR PROGRAM QUESTIONS, CONTACT THE ADVISEMENT CENTER.</p>		

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2022-2023 Program Requirements (82-84 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 8 courses

COMPUTER SCIENCE CORE:

C S 111 - Introduction to Computer Science	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 312 - Algorithm Design and Analysis	3.0
C S 324 - Systems Programming	3.0
C S 404 - Ethics and Computers in Society	2.0

REQUIREMENT 2 Complete 7 courses

BIOLOGY CORE:

*BIO 130 - Biology	4.0
BIO 165 - Introduction to Bioinformatics	3.0
BIO 264 - Statistical Analysis for Biologists	4.0
BIO 364 - Bioinformatics Algorithms	3.0
BIO 465 - Capstone in Bioinformatics	3.0
MMBIO 240 - Molecular Biology	3.0
PWS 340 - Genetics	3.0

REQUIREMENT 3 Complete 6 courses

SUPPORTING COURSES:

CHEM 105 - General College Chemistry 1 with Lab (Integrated)	4.0
MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0
*WRTG 316 - Technical Communication	3.0

REQUIREMENT 4 Complete 1 course

BIO 250 - Evolutionary Medicine	2.0
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BIO 420 - Evolutionary Biology	4.0
REQUIREMENT 5 Complete 1 course	
C S 472 - Introduction to Machine Learning	3.0
C S 474 - Introduction to Deep Learning	3.0

REQUIREMENT 6 Complete 12.0 hours from the following option(s)
COURSES WILL NOT DOUBLE COUNT BETWEEN REQUIREMENT 5 AND REQUIREMENT 6.

OPTION 6.1 Complete up to 12.0 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 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 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 486 - Verification and Validation	3.0
C S 493R - Computing Competitions	3.0

You may take up to 3 credit hours.

C S 513 - Robust Control	3.0
C S 580 - Theory of Predictive Modeling	3.0

OPTION 6.2 Complete up to 6.0 hours from the following course(s)

C S 497R - Undergraduate Research	3.0
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You may take up to 6 credit hours.

C S 498R - Undergraduate Special Projects	3.0v
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You may take up to 3 credit hours.

REQUIREMENT 7

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.

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.

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2022-2023

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

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N-181 ESC
Provo, UT 84602
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