

COMPUTER SCIENCE- MATHEMATICAL SCIENCES B.S. (COMBINED MAJOR)

The purpose of the combined program is to provide a thorough background in both allied disciplines and to inculcate a deeper understanding of their goals and methods. A student must complete 62 credits in the two disciplines:

- 31 of these credits in Computer Science courses and
- 31 of these credits in Mathematical Sciences courses.

Each student plans a program in consultation with a Computer Science and a Mathematical Sciences advisor. Students planning to attend graduate school in computer science or the mathematical sciences should consult with their respective advisors.

General Degree Requirements

To earn a baccalaureate degree, all students must complete successfully, in addition to any other requirements, the University of Montana General Education Requirements. Please refer to the General Education Requirements page (<https://catalog.umt.edu/academics/general-education-requirements/>) for more information.

Additional requirements for graduation can be found on the Degree/Certificate Requirements for Graduation page (<https://catalog.umt.edu/academics/graduation-requirements/>).

Unless otherwise noted in individual program requirements, a minimum grade point average of 2.00 in all work attempted at the University of Montana-Missoula is required for graduation. Please see the Academic Policies and Procedures page (<https://catalog.umt.edu/academics/policies-procedures/>) for information on how your GPA is calculated.

Courses taken to satisfy the requirements of a major, minor, or certificate program must be completed with a grade of C- or better unless a higher grade is noted in the program requirements.

BACHELOR OF SCIENCE - COMPUTER SCIENCE-MATHEMATICAL SCIENCE

Course Requirements

Code	Title	Hours
Mathematical Sciences Core		
Complete all of the following courses:		
M 171	Calculus I	4
or M 181	Honors Calculus I	
M 172	Calculus II	4
or M 182	Honors Calculus II	
M 221	Introduction to Linear Algebra	4
M 273	Multivariable Calculus	4
M 307	Introduction to Abstract Mathematics	3
or M 225	Introduction to Discrete Mathematics	
Mathematical Sciences Electives¹		
Complete 12 credits of the following courses:		
M 274	Introduction to Differential Equations	12

M 325	Discrete Mathematics
M 326	Number Theory
M 361	Discrete Optimization
M 362	Linear Optimization
M 381	Advanced Calculus I
M 412	Partial Differential Equations
M 414	Deterministic Models
M 429	History of Mathematics
M 431	Abstract Algebra I
M 432	Abstract Algebra II
M 439	Euclidean and NonEuclidean Geometry
M 440	Numerical Analysis
M 445	Statistical, Dynamical, and Computational Modeling
M 461	Data Science Analytics
M 462	Theoretical Basics of Big Data Analytics and Real Time Computation Algorithms
M 472	Introduction to Complex Analysis
M 473	Introduction to Real Analysis
M 485	Graph Theory
STAT 342	Probability and Simulation
STAT 421	Probability Theory
STAT 422	Mathematical Statistics
STAT 451	Statistical Methods I
STAT 452	Statistical Methods II

Computer Science Core

Complete all of the following courses:

CSCI 106	Careers in Computer Science	1
CSCI 150	Introduction to Computer Science	3
CSCI 151	Interdisciplinary Computer Science I	3
CSCI 152	Interdisciplinary Computer Science II	3
CSCI 232	Intermediate Data Structures and Algorithms	4
CSCI 258	Web Application Development	3
CSCI 332	Advanced Data Structures and Algorithms	3
CSCI 340	Database Design	3

Computer Science Electives²

Complete 9 credits of upper-division (300-level or higher) CSCI courses.

Science Requirement

Complete the coursework from one of the following subcategories.

Biology		
BIOB 160	Principles of Living Systems	
BIOB 161N	Principles of Living Systems Lab	
BIOB 170N	Principles of Biological Diversity	
BIOB 171N	Principles of Biological Diversity Lab	
Chemistry		
CHMY 141N	College Chemistry I	
CHMY 142N	College Chemistry I Lab	
CHMY 143N	College Chemistry II	
CHMY 144N	College Chemistry II Lab	
Physics		

PHSX 215N	Fundamentals of Physics with Calculus I	
PHSX 216N	Physics Laboratory I with Calculus	
PHSX 217N	Fundamentals of Physics with Calculus II	
PHSX 218N	Physics Laboratory II with Calculus	
Public Speaking Requirement		
Complete one of the following courses:		3
COMX 111A	Introduction to Public Speaking	
COMX 242	Argumentation	
Total Hours		75-76

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The combined 9 credits of Computer Science Electives and twelve 12 credits of Mathematical Sciences Electives must include at least three 3 or 4 credit courses numbered 400 or above, with at least one chosen from each department (not including M 429 and STAT 451, STAT 452).

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A total of at most three of the 9 credits of Computer Science Electives may be in CSCI 398 or CSCI 498.

Suggested Curricula

Students are encouraged to choose their Computer Science and Mathematical Sciences Electives according to one of the following curricula; these tracks are suggestions only and, as such, optional. Note that the suggested curricula do not include an advanced College Writing Course.

Applied Math–Scientific Programming

Code	Title	Hours
M 274	Introduction to Differential Equations	4
M 412	Partial Differential Equations	3
M 414	Deterministic Models	3
Select one of the following:		3-4
M 381	Advanced Calculus I	
M 440	Numerical Analysis	
M 472	Introduction to Complex Analysis	
M 473	Introduction to Real Analysis	
STAT 342	Probability and Simulation	
Select three of the following:		9
CSCI 444	Data Visualization	
CSCI 460	Operating Systems	
CSCI 477	Simulation	

Combinatorics and Optimization–Artificial Intelligence

Code	Title	Hours
M 361	Discrete Optimization	3
M 362	Linear Optimization	3
Select two of the following:		6
M 325	Discrete Mathematics	
M 414	Deterministic Models	
M 485	Graph Theory	
STAT 342	Probability and Simulation	
CSCI 447	Machine Learning	3
CSCI 460	Operating Systems	3

Data Science (Big Data Analytics)

Code	Title	Hours
M 461	Data Science Analytics	3
M 462	Theoretical Basics of Big Data Analytics and Real Time Computation Algorithms	3
STAT 342	Probability and Simulation	3
STAT 451	Statistical Methods I	3
STAT 452	Statistical Methods II	3
Select three of the following:		9
CSCI 444	Data Visualization	
CSCI 447	Machine Learning	
CSCI 464	Applications of Mining Big Data	
CSCI 480	Applied Parallel Computing Techniques	

Statistics–Machine Learning

Code	Title	Hours
STAT 342	Probability and Simulation	3
STAT 421	Probability Theory	3
Select two of the following:		6
M 325	Discrete Mathematics	
M 362	Linear Optimization	
M 485	Graph Theory	
STAT 422	Mathematical Statistics	
Select three of the following:		9
CSCI 340	Database Design	
CSCI 444	Data Visualization	
CSCI 447	Machine Learning	
CSCI 451	Computational Biology	

Algebra–Analysis

Code	Title	Hours
M 381	Advanced Calculus I	3
M 431	Abstract Algebra I	4
Select two of the following:		7-8
M 326	Number Theory	
M 432	Abstract Algebra II	
M 472	Introduction to Complex Analysis	
M 473	Introduction to Real Analysis	
CSCI 426	Software Design & Development I	3
CSCI 460	Operating Systems	3
CSCI Elective		3