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.

Bachelor of Science - Computer Science-Mathematical Science

General Education Requirements

Information regarding these requirements can be found in the General Education Section (http://catalog.umt.edu/academics/general-education-requirements/) of the catalog.

Summary

Code	Title	Hours
Mathematical Science		31
Computer Science		31
Science Requirement		9-10
Biology Sequence Option		
Chemistry Sequence Option		
Physics Sequence Option		
Public Speaking Requirement		3
Total Hours		**74-75**

Degree Specific Credits: 74-75

Required Cumulative GPA: 2.0

Mathematical Sciences

Rule: Complete the following subcategories. 31 total credits required.

Mathematical Sciences Core

Code	Title	Hours
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	
Total Hours		**19**

Minimum Required Grade: C-

Mathematical Sciences Electives

Note: 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).

Code	Title	Hours
Complete 12 credits of the following courses:		**12**
M 274	Introduction to Differential Equations	
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 341	Introduction to Probability and Statistics	
or STAT 342	Probability and Simulation	
STAT 421	Probability Theory	
STAT 422	Mathematical Statistics	
STAT 451	Statistical Methods I	
STAT 452	Statistical Methods II	
Total Hours		**12**

Minimum Required Grade: C-

Computer Science

Rule: Complete the following subcategories. 31 total credits required.

Computer Science Core

Code	Title	Hours
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
Total Hours		**23**

Minimum Required Grade: C-

Computer Science Electives

Rule: In addition to the 22 credits in the Computer Science core, students must take an additional 9 upper division (three hundred level or higher) Computer Science credits.

Notes:

1. A total of at most three of the 9 credits of Computer Science Electives may be in CSCI 398 or CSCI 498.
2. The combined 9 credits of Computer Science Electives and twelve 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).

Code	Title	Hours
Complete 9 credits of upper-division (300-level or higher) CSCI courses.		**9**
Total Hours		**9**

Minimum Required Grade: C-

Science Requirement

Rule: Complete the course work from 1 of the following subcategories. 9-10 total credits required.

Biology

Code	Title	Hours
If you choose biology, complete all of the following courses:		
BIOB 160N	Principles of Living Systems	3
BIOB 161N	Principles of Living Systems Lab	1
BIOB 170N	Principles of Biological Diversity	3
BIOB 171N	Principles of Biological Diversity Lab	2
Total Hours		**9**

Minimum Required Grade: C-

Chemistry

Code	Title	Hours
If you choose chemistry, complete all of the following courses:		
CHMY 141N & CHMY 142N	College Chemistry I and College Chemistry I Lab	5
CHMY 143N & CHMY 144N	College Chemistry II and College Chemistry II Lab	5
Total Hours		**10**

Minimum Required Grade: C-

Physics

Code	Title	Hours
If you choose physics, complete all of the following courses:		
PHSX 215N	Fundamentals of Physics with Calculus I	4
PHSX 216N	Physics Laboratory I with Calculus	1
PHSX 217N	Fundamentals of Physics with Calculus II	4
PHSX 218N	Physics Laboratory II with Calculus	1
Total Hours		**10**

Minimum Required Grade: C-

Public Speaking Requirement

Code	Title	Hours
Complete 1 of the following courses:		**3**
COMX 111A	Introduction to Public Speaking	
COMX 242	Argumentation	
Total Hours		**3**

Minimum Required Grade: C-

Suggested Curricula

Note: 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	3
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 341	Introduction to Probability and Statistics	
Select three of the following:		**9**
CSCI 441	Computer Graphics Programming	
CSCI 444	Data Visualization	
CSCI 460	Operating Systems	
CSCI 477	Simulation	
Total Hours		**21-22**

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 341	Introduction to Probability and Statistics	

CSCI 446	Artificial Intelligence	3
CSCI 447	Machine Learning	3
CSCI 460	Operating Systems	3
Total Hours		**21**

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 341	Introduction to Probability and Statistics	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 448	Pattern Recognition	
CSCI 464	Applications of Mining Big Data	
CSCI 480	Applied Parallel Computing Techniques	
Total Hours		**24**

Statistics–Machine Learning

Code	Title	Hours
STAT 341	Introduction to Probability and Statistics	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 446	Artificial Intelligence	
CSCI 447	Machine Learning	
CSCI 451	Computational Biology	
Total Hours		**21**

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
Total Hours		**23-24**