COMPUTER SCIENCE-MATHEMATICAL SCIENCES (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 60 credits in the two disciplines:

- 30 of these credits in Computer Science courses and
- 30 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

College of Humanities & Sciences

Degree Specific Credits: 73-74

Required Cumulative GPA: 2.0

Catalog Year: 2018-2019

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		30
Science Requirement		9-10
Biology Sequence Option		
Chemistry Sequence Option		
Physics Sequence Option		
Public Speaking Requirement		3
Total Hours		73-74

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 nine 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 12 credits of the following courses:		12
M 311	Ordinary Differential Equations and Systems	
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	
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. 30 total credits required.

Computer Science Core

Code	Title	Hours
Complete all of the following courses:		
CSCI 106	Careers in Computer Science	1
CSCI 135	Fund of Computer Science I	3

CSCI 136	Fund of Computer Science II	3
CSCI 205	Programming Languages w/ C/C++	4
CSCI 232	Data Structures and Algorithms	4
CSCI 332	Design/Analysis of Algorithms	3
CSCI 361	Computer Architecture	3
Total Hours		21

Minimum Required Grade: C-

Computer Science Electives

Note:

1. A total of at most three of the nine credits of Computer Science Electives may be in CSCI 398 or CSCI 498.
2. The combined nine 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 the following courses:		9
CSCI 315E	Computers, Ethics, and Society	
CSCI 323	Software Science	
CSCI 340	Database Design	
CSCI 390	Research	
CSCI 391	Special Topics	
CSCI 394	Seminar	
CSCI 398	Internship	
CSCI 411	Advanced Web Programming	
CSCI 412	Game and Mobile App	
CSCI 426	Adv Prgrmng Theory/Practice I	
CSCI 427	Adv Prgrmng Theory/Practice II	
CSCI 441	Computer Graphics Programming	
CSCI 443	User Interface Design	
CSCI 444	Data Visualization	
CSCI 446	Artificial Intelligence	
CSCI 447	Machine Learning	
CSCI 448	Pattern Recognition	
CSCI 451	Computational Biology	
CSCI 460	Operating Systems	
CSCI 464	Applications of Mining Big Data	
CSCI 466	Networks	
CSCI 477	Simulation	
CSCI 480	Applied Parallel Computing Techniques	
CSCI 490	Research	
CSCI 491	Special Topics	
CSCI 494	Seminar	
CSCI 498	Internship	
CSCI 499	Senior Thesis/Capstone	
Total Hours		9

Minimum Required Grade: C-

Science Requirement

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

Biology Sequence Option

Code	Title	Hours
Complete all of the following courses:		
BIOB 160N	Principles of Living Systems	3
BIOB 161N	Prncpls of Living Systems Lab	1
BIOB 170N	Princpls Biological Diversity	3
BIOB 171N	Princpls Biological Dvrsty Lab	2
Total Hours		9

Minimum Required Grade: C-

Chemistry Sequence Option

Code	Title	Hours
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 Sequence Option

Code	Title	Hours
Complete all of the following courses:		
PHSX 215N	Fund of Physics w/Calc I	4
PHSX 216N	Physics Laboratory I w/Calc	1
PHSX 217N	Fund of Physics w/Calc II	4
PHSX 218N	Physics Laboratory II w/Calc	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 311	Ordinary Differential Equations and Systems	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	Adv Prgrmng Theory/Practice I	3
CSCI 460	Operating Systems	3
CSCI Elective		3
Total Hours		23-24