Applied and Computational Mathematics, Scientific Computing Emphasis, BS

Program Description

The Bachelor of Science Degree in Applied and Computational Mathematics (ACM) provides students with a new reason to major in mathematical sciences by emphasizing applied mathematics and mathematical modeling. Students will learn to apply mathematics to real world problems arising in various settings, as they master new mathematical techniques. ACM students will have the option to specialize in a desired field through emphases in Actuarial Science, Data Analytics, or Scientific Computing. The Scientific Computing emphasis will provide an interdisciplinary approach by collaborating with programs in Mathematics, Computer Science, Physics, and Engineering. Students will develop the knowledge and skills necessary for a wide range of employment opportunities in industry and government laboratories, as well as for entry into graduate schools.

Program Curriculum

120 credits

Utah Tech General Education Requirements

All Utah Tech General Education requirements must be fulfilled. A previously earned degree may fulfill those requirements, but courses must be equivalent to Utah Tech's minimum General Education standards in American Institutions, English, and Mathematics.

General Education Core Requirements (https://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)

Code	Title	Hours
English		3-7
Mathematics		3-5
American Institutions		3-6
Life Sciences		3-10
Physical Sciences		3-5
Fine Arts		3
Literature/Humanities		3
Social & Behavioral Sciences		3
Exploration		3-5

Applied and Computational Mathematics Core Requirements

Code	Title	Hours
CS 1400	Fundamentals of Programming	3
CS 1410	Object Oriented Programming	3
MATH 1210	Calculus I (MA)	4
MATH 1220	Calculus II (MA)	4
MATH 2200	Discrete Mathematics	3
or CS 2100	Discrete Structures	
MATH 2210	Multivariable Calculus (MA)	4
MATH 2270	Linear Algebra	3
MATH 2280	Ordinary Differential Equations	3
MATH 3400	Probability & Statistics	3
MATH 3700	Mathematical Modeling I	4
MATH 4250	Programming for Scientific Computation	4
MATH 4800	Industrial Careers in Mathematics	3

MATH 4890R	Independent Research	1
MATH 4900	Senior Capstone Seminar (ALUR)	3

Applied and Computational Mathematics Scientific Computing Elective Requirements

Code	Title	Hours
Choose 4 of the following courses:		
MATH 3050	Stochastic Modeling and Applications	3
MATH 3450	Statistical Inference	3
MATH 3120	Transition to Advanced Mathematics	3
MATH 3100	Euclidean / Non-Euclidean Geom	3
MATH 3900	Number Theory	3
MATH 3905	Cryptography and Codes	3
MATH 4000	Abstract Algebra I	3
MATH 4005	Quantum Computing and Cryptography	3
MATH 4010	Abstract Algebra II	3
MATH 4100	Introduction to Topology	3
MATH 4330	Linear Algebra II	3
MATH 4890R	Independent Research	1-3
MATH 3200	Introduction to Analysis I	3
MATH 4200	Introduction to Complex Analysis	3
MECH 3600	Thermodynamics	4
MECH 3700	Fluid Mechanics	4
MECH 3705	Fluid Mechanics Lab	0.5
PHYS 3400	Classical Mechanics	3
PHYS 3710	Intermediate Modern Physics	3
XSCI 3800	Measurement & Evaluation in Physical Exercise & Sports	3

Scientific Computing Emphasis Requirements

Code	Title	Hours
CS 2420	Introduction to Algorithms and Data Structures	3
CS 3005	Programming in C++	3
COMM 1020	Public Speaking	3
MATH 2050	Applied Statistics with Programming	3
MATH 3150	Introduction to Partial Differential Equations	3
MATH 3500	Numerical Analysis	3
MATH 4550	Scientific Computation	3
MECH 2010	Statics	3
MECH 2030	Dynamics	3
PHYS 2210	Physics/Scientists Engineers I (PS)	4
PHYS 2215	Physics/Scientists Engineers I Lab (LAB)	1
PHYS 2220	Physics/Scientists EngineersII	4
PHYS 2225	Physics/Scientists Engineers II Lab	1

Graduation Requirements

1. Complete a minimum of 120 college-level credits (1000 and above).
2. Complete at least 40 upper-division credits (3000 and above).
3. Complete at least 30 upper-division credits at Utah Tech for institutional residency
4. Grade C or higher (not C-) required in each Core Discipline Requirement, Mathematics Required Elective, and Mathematics Program Requirement course.

Graduation Plan

1st Year

Fall Semester	Hours	Spring Semester	Hours
MATH 1210	4	MATH 1220	4
ENGL 1010	3	MATH 2270	3
General Education (Fine Arts) (https://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3	CS 1400	3
General Education (American Institutions) (https://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3	ENGL 2010	3
		General Education (Literature & Humanities) (https://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3
	13		**16**

2nd Year

Fall Semester	Hours	Spring Semester	Hours
MATH 2210	4	MATH 2280	3
PHYS 2210	4	MATH 2200 or 3310	3
PHYS 2215	1	CS 1410	3
MECH 2010	3	PHYS 2220	4
MATH 2050	3	PHYS 2225	1
		MECH 2030	3
	15		**17**

3rd Year

Fall Semester	Hours	Spring Semester	Hours
MATH 3400	3	MATH 4250	4
MATH 3500	3	MATH 4550	3
MATH 3700	4	MATH 4890R	1
CS 3005	3	CS 2420	3
COMM 1020	3	Program Elective 1	3
	16		**14**

4th Year

Fall Semester	Hours	Spring Semester	Hours
MATH 3150	3	MATH 4900	3
MATH 4800	3	Program Elective 3	3
Program Elective 2	3	Program Elective 4	3
General Education (Social & Behavioral Sciences) (https://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3	Elective (Upper or lower division)	3
General Elective	2	General Education (Life Sciences) (https://catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)	3
	14		**15**

Total Hours 120

BS Applied and Computational Mathematics Program Learning Outcomes

At the successful conclusion of this program, students will be able to:

1. Integrate mathematical techniques in solving computational problems.
2. Design mathematical models to solve real-world problems.
3. Communicate in mathematical language through the use of accurate notation and terminology.
4. Formulate and analyze mathematical concepts using technology as appropriate.
5. Author effective communication in a variety of formats for a range of audiences.