APPLIED MATHEMATICS, BACHELOR OF SCIENCE

College of Letters & Science

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program

After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty advisor. Upper division courses include real analysis, probability, modern algebra, as well as a variety of other courses that allow students to further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

Career Alternatives

A degree in mathematics provides entry to many careers in industry in addition to teaching. For instance, operations research, data analysis, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

Major Advisors

For a current list of faculty and staff advisors, see Math Department Advising or contact the Student Services office (studentservices@math.ucdavis.edu).

Mathematics Placement Requirement

Students who wish to enroll in MAT 012, MAT 017A, MAT 019A, MAT 021A, MAT 021AH, and MAT 021M must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see Math Placement Requirement (MPR), well in advance of enrolling.

Department Honors

Students who meet the minimum GPA requirement for honors at graduation from the College of Letters & Science and who complete a senior project as part of MAT 194 or MAT 199 units in consultation with their faculty advisor may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see Honors & Awards (https://www.math.ucdavis.edu/research/honors/).

Graduate Study

The Department offers programs of study and research leading to M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting Graduate Information (https://www.math.ucdavis.edu/grad/), and by email (studentservices@math.ucdavis.edu).

The major requirements below are in addition to meeting University Requirements (https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/) & College Requirements (https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/); unless otherwise noted. The minimum number of units required for the Applied Mathematics Bachelor of Science major is 91.

Code	Title	Units
Preparatory Subject Matter		
Calculus		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
Linear Algebra & Proof-Writing		
Choose one option:		4-8
(a)		
MAT 022A	Linear Algebra	
MAT 108	Introduction to Abstract Mathematics	
or MAT 108V	Introduction to Abstract Mathematics	
(b)		
MAT/BIS 027A	Linear Algebra with Applications to Biology	
MAT 108	Introduction to Abstract Mathematics	
or MAT 108V	Introduction to Abstract Mathematics	
(c)		
MAT 067	Modern Linear Algebra	
MATLAB [1]		*1*
MAT 022AL	Linear Algebra Computer Laboratory	
Equivalent MATLAB knowledge.		
Differential Equations		
MAT/BIS 027B	Differential Equations with Applications to Biology	3-4
or MAT 022B	Differential Equations	
Programming		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
ENG 006	Engineering Problem Solving	4
Choose one two-quarter sequence:		*8-10*
Biological Science		
BIS 002A & BIS 002B	Introduction to Biology: Essentials of Life on Earth and Introduction to Biology: Principles of Ecology & Evolution	
Chemistry		
CHE 002A & CHE 002B	General Chemistry and General Chemistry	
Economics		
ECN 001A	Principles of Microeconomics	
or ECN 001AV	Principles of Microeconomics	
or ECN 001AY	Principles of Microeconomics	
AND		
ECN 001B	Principles of Macroeconomics	

or ECN 001BV	Principles of Macroeconomics	

Physics

PHY 009A & PHY 009B	Classical Physics and Classical Physics	

Statistics

STA 032 & STA 100	Gateway to Statistical Data Science and Applied Statistics for Biological Sciences	

or Other applied preparatory courses approved by your advisor.

Preparatory Subject Matter Subtotal	40-47

Depth Subject Matter

A. Core Courses

MAT 119A	Ordinary Differential Equations	4
MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 135A	Probability	4
MAT 150A	Modern Algebra	4
MAT 185A	Complex Analysis	4
Choose two:		8
MAT 128A	Numerical Analysis	
MAT 128B	Numerical Analysis in Solution of Equations	
MAT 128C	Numerical Analysis in Differential Equations	

B. Enrichment Courses

1. Choose two:	8

MAT 111-MAT 185B; excluding MAT 180, core courses, & courses being used as a capstone.

2. Choose one approved upper division course outside the Department of Mathematics with extensive use of mathematics. Please consult with a math advisor before selecting a course.	4

ATM 120	Atmospheric Thermodynamics & Cloud Physics
ATM 121A	Atmospheric Dynamics
ATM 121B	Atmospheric Dynamics
ATM 128	Atmospheric Radiation & Remote Sensing
ARE 106	Econometric Theory & Applications
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics
CHE 110B	Physical Chemistry: Properties of Atoms & Molecules
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria & Kinetics
EEC 130A	Electromagnetics I
EEC 130B	Introductory Electromagnetics II
ECH 140	Mathematical Methods in Biochemical & Chemical Engineering
ECI 114	Probabilistic Systems Analysis for Civil & Environmental Engineers
ECI 153	Deterministic Optimization & Design
ECN 122	Theory of Games & Strategic Behavior
ECN 140	Econometrics
ECS 120	Theory of Computation
ECS 122A	Algorithm Design & Analysis
ECS 127	Cryptography
EME 115	Introduction to Numerical Analysis & Methods
ESP 150A	Physical & Chemical Oceanography
EVE 102	Population & Quantitative Genetics
GEL 150A	Physical & Chemical Oceanography
LIN 177	Computational Linguistics
PHY 104A	Introduction to Mathematical Methods in Physics
PHY 104B	Computational Methods of Mathematical Physics
PHY 104C	Intermediate Methods of Mathematical Physics
PHY 105A	Classical Mechanics
PHY 105B	Analytical Mechanics
PHY 108	Optics
PHY 110A	Electricity & Magnetism
PHY 110B	Electricity & Magnetism
PHY 110C	Electricity & Magnetism
PHY 112	Thermodynamics & Statistical Mechanics
PHY 115A	Foundation of Quantum Mechanics
PHY 115B	Applications of Quantum Mechanics
PHY 116A	Electronic Instrumentation
PHY 116B	Electronic Instrumentation
PSC 103A	Statistical Analysis of Psychological Data
PSC 103B	Statistical Analysis of Psychological Data
STA 131B	Introduction to Mathematical Statistics
STA 131C	Introduction to Mathematical Statistics
STA 141A	Fundamentals of Statistical Data Science
STA 141B	Data & Web Technologies for Data Analysis
STA 141C	Big Data & High Performance Statistical Computing

C. Capstone Courses

Choose one:	3-4
MAT 115B	Number Theory
MAT 118B	Partial Differential Equations: Eigenfunction Expansions
MAT 119B	Ordinary Differential Equations
MAT 135B	Stochastic Processes
MAT 146	Algebraic Combinatorics
MAT 150B	Modern Algebra
MAT 150C	Modern Algebra
MAT 180	Special Topics
MAT 185B	Complex Analysis
MAT 189	Advanced Problem Solving
MAT 192	Internship in Applied Mathematics (Must take 3 units.)
MAT 194	Undergraduate Thesis

Depth Subject Matter Subtotal	51-52
Total Units	**91-99**

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Note: Basic knowledge of MATLAB is required for both MAT 022A and MAT 067. Students can learn it on their own, enroll in ENG 006, or in the 1 unit course MAT 022AL (can be taken concurrently).