

# APPLIED MATHEMATICS, BACHELOR OF SCIENCE

College of Letters & Science

## The Major Programs

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 016A, MAT 017A, 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).

Code	Title	Units
<b>Preparatory Subject Matter</b>		
<i>Calculus</i>		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
<i>Linear Algebra &amp; Proof-Writing</i>		
Choose one option:		4-8
(a)		
MAT 022A	Linear Algebra	
MAT 108	Introduction to Abstract Mathematics	
(b)		
MAT/BIS 027A	Linear Algebra with Applications to Biology	
MAT 108	Introduction to Abstract Mathematics	
(c)		
MAT 067	Modern Linear Algebra	
<i>MATLAB</i> <sup>1</sup>		1
MAT 022AL	Linear Algebra Computer Laboratory	
Equivalent MATLAB knowledge.		
<i>Differential Equations</i>		
MAT/BIS 027B	Differential Equations with Applications to Biology	3-4
or MAT 022B	Differential Equations	
<i>Programming</i>		
ECS 032A	Introduction to Programming	4
ENG 006	Engineering Problem Solving	4
Choose one two-quarter sequence:		8-10
<i>Physics</i>		
PHY 009A & PHY 009B	Classical Physics and Classical Physics	
<i>Biological Science</i>		
BIS 002A & BIS 002B	Introduction to Biology: Essentials of Life on Earth and Introduction to Biology: Principles of Ecology & Evolution	
<i>Chemistry</i>		
CHE 002A & CHE 002B	General Chemistry and General Chemistry	
<i>Economics</i>		
ECN 001A	Principles of Microeconomics	
or ECN 001AV	Principles of Microeconomics	
or ECN 001AY	Principles of Microeconomics	
<b>AND</b>		
ECN 001B	Principles of Macroeconomics	
or ECN 001BV	Principles of Macroeconomics	
<i>Statistics</i>		
STA 032 & STA 100	Gateway to Statistical Data Science and Applied Statistics for Biological Sciences	
<b>or Other applied preparatory courses approved by your advisor.</b>		

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	Radiation & Satellite Meteorology	
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**

<sup>1</sup> **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, EME 005, or in the 1 unit course MAT 022AL (can be taken concurrently).