

MATHEMATICAL ANALYTICS & OPERATIONS RESEARCH, 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 (<https://www.math.ucdavis.edu/undergrad/advising/advisers/>) or contact Student Services (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) (http://www.math.ucdavis.edu/undergrad/math_placement/), well in advance of enrolling.

Department Honors

Students who meet the minimum GPA requirement for honors at graduation for 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 our website or contacting Student Services (studentservices@math.ucdavis.edu).

Code	Title	Units
Preparatory Subject Matter		
<i>Mathematics</i>		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
<i>Linear Algebra & Proof-Writing</i> ¹		
Choose one option:		4-8
(a)		
MAT 022A	Linear Algebra	
MAT 108	Introduction to Abstract Mathematics	
or		
MAT/BIS 027A	Linear Algebra with Applications to Biology	
MAT 108	Introduction to Abstract Mathematics	
or		
(b)		
MAT 067	Modern Linear Algebra	
Choose one:		0-1
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
or ENG 006		Engineering Problem Solving
<i>Economics</i>		
ECN 001A	Principles of Microeconomics	4
or ECN 001AV		Principles of Microeconomics
or ECN 001AY		Principles of Microeconomics
ECN 001B	Principles of Macroeconomics	4
or ECN 001BV		Principles of Macroeconomics
<i>Statistics</i>		
STA 032	Gateway to Statistical Data Science	4
or STA 100		Applied Statistics for Biological Sciences
Preparatory Subject Matter Subtotal		39-45
Depth Subject Matter		
<i>A. Core Courses</i>		
MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 135A	Probability	4
MAT 135B	Stochastic Processes	4
MAT 150A	Modern Algebra	4
MAT 168	Optimization	4

MAT 170	Mathematics for Data Analytics & Decision Making ²	4	Depth Subject Matter Subtotal	55-56
Choose one:		4	Total Units	94-101
MAT 128A	Numerical Analysis			
MAT 128B	Numerical Analysis in Solution of Equations			
MAT 128C	Numerical Analysis in Differential Equations			
B. Enrichment Courses				
1. Enrichment A				
Choose two:		8		
MAT 111-MAT 185B ³				
STA 131B	Introduction to Mathematical Statistics			
STA 131C	Introduction to Mathematical Statistics			
STA 137	Applied Time Series Analysis			
STA 141A	Fundamentals of Statistical Data Science			
STA 141B	Data & Web Technologies for Data Analysis			
STA 141C	Big Data & High Performance Statistical Computing			
2. Enrichment B				
Choose two:		8		
ECN 100A	Intermediate Micro Theory: Consumer & Producer Theory			
ECN 100B	Intermediate Micro Theory: Imperfect Competition & Market Failure			
ECN 121A	Industrial Organization			
ECN 121B	Industrial Organization			
ECN 122	Theory of Games & Strategic Behavior			
ECN 134	Financial Economics			
ARE 100A	Intermediate Microeconomics: Theory of Production & Consumption			
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets & Welfare Economics			
ARE 155	Operations Research & Management Science			
ARE 156	Introduction to Mathematical Economics			
ARE 157	Analysis for Operations & Production Management			
C. Capstone Course				
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			

¹ **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).

² Please note that MAT 170 has a prerequisite of MAT 167. MAT 167 can be used to satisfy one of the two required Enrichment A courses.

³ Excluding MAT 180, core courses, and courses being used as a capstone.