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 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) (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).

The major requirements below are in addition to meeting University Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/) & College Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/); unless otherwise noted. The minimum number of units required for the Mathematical Analytics & Operations Research Bachelor of Science is 94.

Code	Title	Units
Preparatory Subject Matter		
Mathematics		
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	
or		
MAT/BIS 027A	Linear Algebra with Applications to Biology	
MAT 108	Introduction to Abstract Mathematics	
or MAT 108V	Introduction to Abstract Mathematics	
or		
(b)		
MAT 067	Modern Linear Algebra	
MATLAB		*0-1*
MAT 022AL	Linear Algebra Computer Laboratory	
Equivalent MATLAB knowledge. [1]		
Differential Equations		*3-4*
MAT/BIS 027B	Differential Equations with Applications to Biology	
or MAT 022B	Differential Equations	
Programming		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ENG 006	Engineering Problem Solving	
Economics		
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	
Statistics		
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		
A. Core Courses		
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
Choose one:		4
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	
or ECN 100AV	Intermediate Micro Theory: Consumer & Producer Theory	
or ARE 100A	Intermediate Microeconomics: Theory of Production & Consumption	
ECN 100B	Intermediate Micro Theory: Imperfect Competition & Market Failure	
or ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets & Welfare Economics	
ECN 121A	Industrial Organization	
ECN 121B	Industrial Organization	
ECN 122	Theory of Games & Strategic Behavior	
ECN 134	Financial Economics	
or ECN 134Y	Financial 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	
Depth Subject Matter Subtotal		55-56
Total Units		**94-101**

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, or in the 1 unit course MAT 022AL (can be taken concurrently).

2

Please note that MAT 170 has a prerequisite of MAT 167, or MAT 128B, or ECS 130. MAT 167 or MAT 128B 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.