MATHEMATICAL & SCIENTIFIC COMPUTATION, 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**

**Mathematics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 017A</td>
<td>Calculus for Biology &amp; Medicine</td>
<td>4</td>
</tr>
<tr>
<td>or MAT 021A</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MAT 017B</td>
<td>Calculus for Biology &amp; Medicine</td>
<td>4</td>
</tr>
<tr>
<td>or MAT 021B</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MAT 017C</td>
<td>Calculus for Biology &amp; Medicine</td>
<td>4</td>
</tr>
<tr>
<td>or MAT 021C</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MAT 021D</td>
<td>Vector Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MAT/BIS 027B</td>
<td>Differential Equations with Applications to Biology</td>
<td>3-4</td>
</tr>
<tr>
<td>or MAT 022B</td>
<td>Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

**Linear Algebra & Proof-Writing**

Choose one option: 4-8

(a) MAT 108 Introduction to Abstract Mathematics

MAT/BIS 027A Linear Algebra with Applications to Biology

or MAT 022A Linear Algebra

(b) MAT 067 Modern Linear Algebra

Choose one: 0-1

MAT 022AL Linear Algebra Computer Laboratory

Equivalent MATLAB knowledge. ¹

**Programming**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS 032A</td>
<td>Introduction to Programming</td>
<td>4</td>
</tr>
<tr>
<td>ENG 006</td>
<td>Engineering Problem Solving</td>
<td>4</td>
</tr>
</tbody>
</table>

**Depth Subject Matter Subtotal** 31-37

**A. Core Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 127A</td>
<td>Real Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MAT 127B</td>
<td>Real Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MAT 127C</td>
<td>Real Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MAT 128A</td>
<td>Numerical Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MAT 128B</td>
<td>Numerical Analysis in Solution of Equations</td>
<td>4</td>
</tr>
<tr>
<td>MAT 128C</td>
<td>Numerical Analysis in Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MAT 135A</td>
<td>Probability</td>
<td>4</td>
</tr>
<tr>
<td>MAT 150A</td>
<td>Modern Algebra</td>
<td>4</td>
</tr>
</tbody>
</table>

**B. Enrichment Courses**

Choose two: 8

MAT 111-MAT 185B worth at least 4 units each. ²

**C. Emphasis**

Choose one: 8

Computational & Mathematical Biology Emphasis
MAT 124 Mathematical Biology
And
One approved upper division course in Biology; please consult with a math advisor before selecting a course.

OR
Computational & Mathematics Emphasis
MAT 168 Optimization
And
One approved upper division course involving extensive computation or theory of computation; please consult with a math advisor before selecting a course.

D. 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 51-52
Total Units 82-89

1 Note: Basic knowledge of MATLAB is required for both MAT 022A & 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 Excluding MAT 180. Note that core math major classes cannot be used to satisfy this requirement.