## Bachelor of Science in Mathematics

The Bachelor of Science in Mathematics program is designed for the student who, upon graduation, plans to pursue graduate studies in mathematics, begin a career in mathematics or closely related field, or pursue teaching. We offer three distinct concentrations. Students are encouraged to speak to a mathematics faculty advisor to select the appropriate concentration and elective courses that will best fit their career goals.

The General Mathematics Concentration provides a deep level of study in mathematics and includes advanced topics in real analysis and algebra, which are prerequisites for many graduate programs. This concentration requires a total of 64-67 units of coursework; of those, up to 13 units may be selected from courses that count towards the University's General Education requirements in categories A3, B1 or B2, B3, B4, and the requirement for an upper-division writing-intensive course.

The Applied Mathematics Concentration combines mathematics coursework with coursework options in actuarial science, biology, chemistry, computer science, economics, geography, and physics. This concentration requires a total of 67-74 units of coursework; of those, up to 16 units may be selected from courses that count towards the University's General Education requirements in categories A3, B1, B2, B3, B4, and the requirement for an upper-division writing-intensive course.

The Teaching Mathematics Concentration is recommended for prospective secondary mathematics teachers and includes courses designed to help build the specialized content knowledge necessary for successful teaching. The mathematics requirements of this concentration (including the core mathematics requirements for the B.S.) comprise a California Commission on Teacher Credentialing approved subject matter preparation program. Subject Matter Competence (SMC) for the Single Subject Teaching Credential may be demonstrated by completion of all lower and upper division mathematics requirements of the Bachelor of Science in Mathematics - Teaching Concentration with (1) a 2.7 GPA or higher, and (2) no grade lower than a C (2.0) in those courses. Students who meet this standard do not need to verify SMC through the CSET exam. Students who do NOT meet this standard may be required to take the CSET exams to verify SMC. Note that this demonstration of SMC is required for the Single Subject Teaching Credential, but is not a requirement of the B.S. degree. This concentration requires a total of 63-74 units of coursework; of those, up to 9 units count towards the University's General Education requirements in categories A3, B1, B2, B3, B4, and the requirement for an upper-division writing-intensive course.

### Requirements (63-74 units)

Total units required for graduation: 120

### Requirements for the B.S. in Mathematics

#### Lower-division requirements (22-23)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2210</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2220</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2265</td>
<td>Statistics with Applications</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2310</td>
<td>Applied Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2320</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following CSE courses: 3-4

#### Upper-division requirements (15)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3100</td>
<td>Mathematical Thinking: Communication and Proof</td>
<td>4</td>
</tr>
<tr>
<td>MATH 3329</td>
<td>Euclidean Geometry with Transformations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4300</td>
<td>Real Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH 4600</td>
<td>Theory of Rings and Fields</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: Math 3100 satisfies the GE upper-division Writing Intensive (WI) requirement.

### Concentrations (26-36 Units)

#### General Mathematics Concentration (27-29 units)

(Program Code: MATH)

#### Lower-division requirements (6-8)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2270</td>
<td>Differential Equations with Dynamical Systems I</td>
<td>3</td>
</tr>
</tbody>
</table>

In addition to the lower-division CSE requirement, select one 2000-level course from the following: BIOL, CHEM, CSE, ECON, GEOG, PHIL, and PHYS, with the exception of ECON 2000, GEOG 2000, GEOG 2200, and GEOG 2201.

#### Upper-division requirements (6)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 5300</td>
<td>Advanced Real Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 5600</td>
<td>Group Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Electives (15)

Five courses (15 units) selected from the following with at least one course from each of Group A, Group B, and Group C. 15

**Group A:**

- MATH 3345: Number Theory
- MATH 3372: Combinatorics
- MATH 3770: Introduction to Graph Theory

**Group B:**

- MATH 4270: Differential Equations with Dynamical Systems II
- MATH 4455: Partial Differential Equations & Fourier Analysis

**Group C:**

- MATH 4485: Differential Geometry
- MATH 5170: Complex Analysis
- MATH 5310: Advanced Linear Algebra
- MATH 5529: Advanced Topics in Geometry
- MATH 5550: Introduction to Topology

**Group D:**

- MATH 3320: Mathematical Interest Theory
- MATH 3460: Probability Theory
- MATH 3480: Topics in History of Mathematics
- MATH 4320: Introduction to Actuarial Modeling
- MATH 4360: Linear Statistical Models
- MATH 5510: Topics in Advanced Mathematics
- MATH 5565: Mathematical Statistics
- MATH 5953: Independent Study

Total Units: 63-74
Applied Mathematics Concentration (30-36 units)

(Program Code: MAAM)

**Lower-division requirements (9-13)**

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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH 2270</td>
<td>Differential Equations with Dynamical Systems I</td>
<td>3</td>
</tr>
</tbody>
</table>

In addition to the lower-division CSE requirement, select two 2000-level courses totaling 6 units or more from the following: BIOL, CHEM, CSE, ECON, GEOG, PHIL, and PHYS with the exception of ECON 2000, GEOG 2000, GEOG 2200, and GEOG 2201.

**Upper-division requirements (3)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 5310</td>
<td>Advanced Linear Algebra</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives (18-20)**

Six courses (18-20 units) selected from the following with four courses from Group A and two courses from Group B. At least three elective courses must be chosen from the 4000-level or above.

- **Group A:**
  - MATH 3320: Mathematical Interest Theory
  - MATH 3372: Combinatorics
  - MATH 3460: Probability Theory
  - MATH 3770: Introduction to Graph Theory
  - MATH 4270: Differential Equations with Dynamical Systems II
  - MATH 4320: Introduction to Actuarial Modeling
  - MATH 4360: Linear Statistical Models
  - MATH 4455: Partial Differential Equations & Fourier Analysis
  - MATH 5565: Mathematical Statistics

One upper-division course from BIOL, CHEM, CSE, ECON, GEOG, or PHYS selected in consultation with an advisor.

- **Group B:**
  - MATH 2270: Differential Equations with Dynamical Systems I
  - MATH 3140: Introduction to Systems Modeling
  - MATH 3320: Mathematical Interest Theory
  - MATH 3372: Combinatorics
  - MATH 3770: Introduction to Graph Theory
  - MATH 4270: Differential Equations with Dynamical Systems II
  - MATH 4320: Introduction to Actuarial Modeling
  - MATH 4360: Linear Statistical Models
  - MATH 4455: Partial Differential Equations & Fourier Analysis
  - MATH 5565: Mathematical Statistics

Total Units: 30-36

Teaching Mathematics Concentration (26 units)

(Program Code: MATM)

**Lower-division requirements (4)**

<table>
<thead>
<tr>
<th>Course</th>
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<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2900</td>
<td>Problem Solving and Mathematical Reasoning for Teachers I</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper-division requirements (16)**

<table>
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<tr>
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<th>Units</th>
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</thead>
<tbody>
<tr>
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<td>Number Theory</td>
<td>3</td>
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<td>MATH 3460</td>
<td>Probability Theory</td>
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<tr>
<th>Course</th>
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<th>Units</th>
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<tbody>
<tr>
<td>MATH 3480</td>
<td>Topics in History of Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4900</td>
<td>Problem Solving and Mathematical Reasoning for Teachers II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 5900</td>
<td>Senior Seminar for Future Mathematics Educators</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives (6)**

Two courses (6 units) selected from the following with at least one course from Group A.

- **Group A:**
  - MATH 5170: Complex Analysis
  - MATH 5300: Advanced Real Analysis
  - MATH 5310: Advanced Linear Algebra
  - MATH 5529: Advanced Topics in Geometry
  - MATH 5550: Introduction to Topology
  - MATH 5565: Mathematical Statistics
  - MATH 5600: Group Theory

- **Group B:**
  - MATH 2270: Differential Equations with Dynamical Systems I
  - MATH 3140: Introduction to Systems Modeling
  - MATH 3320: Mathematical Interest Theory
  - MATH 3372: Combinatorics
  - MATH 3770: Introduction to Graph Theory
  - MATH 4270: Differential Equations with Dynamical Systems II
  - MATH 4320: Introduction to Actuarial Modeling
  - MATH 4360: Linear Statistical Models
  - MATH 4455: Partial Differential Equations & Fourier Analysis
  - MATH 5565: Mathematical Statistics

Total Units: 26