Bachelor of Science in Mathematics

Requirements (102-120 units)

Total units required for graduation: 180-182

Requirements for the B.S. in Mathematics

Lower-division requirements (30)

- CSE 201 Computer Science I 4
- MATH 211 Basic Concepts of Calculus 4
- MATH 212 Calculus II 4
- MATH 213 Calculus III 4
- MATH 241 Problem Solving in Calculus 2
- MATH 251 Multivariable Calculus I 4
- MATH 252 Multivariable Calculus II 4
- MATH 270 Elementary Differential Equations 4

Upper-division requirements (32)

- MATH 329 Transformation Geometry 4
- MATH 331 Linear Algebra 4
- MATH 345 Number Theory and Proof 4
- MATH 355 Analysis and Proof 4
- MATH 372 Combinatorics 4
- MATH 465 Probability Theory 4
- MATH 545 Abstract Algebra I 4
- MATH 553 Analysis I 4

Concentration (40-56)

Students must choose either the general track or one of the applied concentrations which follow:

Total Units 102-118

General Track (Program Code: MAGT)

Lower-division requirement (5)

- PHYS 221 General Physics I 5

Electives (36)

Thirty-six units of mathematics electives selected from the following, with at least eight units chosen from 500-level courses. At least twelve units must be chosen from group A, and at least twelve units must be chosen from group B below.

Group A (Applied Mathematics):
- MATH 320 Mathematical Interest Theory
- MATH 455 Fourier Analysis
- MATH 470 Ordinary Differential Equations
- MATH 474 Numerical Methods
- MATH 557 Complex Variables
- MATH 565 Mathematical Statistics
- MATH 570 Partial Differential Equations
- MATH 576 Introduction to Mathematical Methods

Group B (Pure Mathematics):
- MATH 480 Topics in History of Mathematics
- MATH 485 Differential Geometry
- MATH 510 Topics in Mathematics

Total Units 56-58

Concentration in Biology (56-58 units)
(Program Code: MABC)

Lower-division requirements (27)

- BIOL 200 Biology of the Cell 5
- BIOL 201 Biology of Organisms 5
- BIOL 202 Biology of Populations 5
- CHEM 215 General Chemistry I: Atomic Structure and Chemical Bonding 6
- CHEM 216 General Chemistry II: Principles of Chemical Reactions 6

Upper-division requirements (17)

- BIOL 300 Cell Physiology 5
- MATH 470 Ordinary Differential Equations 4
- MATH 565 Mathematical Statistics 4
- MATH 576 Introduction to Mathematical Methods 4

Electives (12-14)

A minimum of eight units chosen from:

- BIOL 321 Evolution
- BIOL 423 Genetics
- BIOL 450 Ecology
- BIOL 522 Population Genetics
- BIOL 572 Virology
- BIOL 573 Immunology

Four units chosen from:

- MATH 320 Mathematical Interest Theory
- MATH 455 Fourier Analysis
- MATH 474 Numerical Methods
- MATH 480 Topics in History of Mathematics
- MATH 485 Differential Geometry
- MATH 510 Topics in Mathematics
- MATH 529 Advanced Geometry
- MATH 531 Advanced Linear Algebra
- MATH 546 Abstract Algebra II
- MATH 554 Analysis II
- MATH 555 Introduction to Point-Set Topology
- MATH 557 Complex Variables
- MATH 570 Partial Differential Equations
- MATH 595D Independent Study

Total Units 56-58

Concentration in Computer Science (40 units)
(Program Code: MACS)

Lower-division requirement (4)

- CSE 202 Computer Science II 4
- MATH 529 Advanced Geometry
- MATH 531 Advanced Linear Algebra
- MATH 546 Abstract Algebra II
- MATH 554 Analysis II
- MATH 555 Introduction to Point-Set Topology
- MATH 595D Independent Study

Total Units 41
Bachelor of Science in Mathematics

### Upper-division requirements (8)
- CSE 320 Programming Languages 4
- CSE 330 Data Structures 4

**Electives (28)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 420</td>
<td>Computer Graphics</td>
<td>4</td>
</tr>
<tr>
<td>CSE 431</td>
<td>Algorithm Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CSE 500</td>
<td>Introduction to Formal Languages and Automata</td>
<td>4</td>
</tr>
<tr>
<td>CSE 501</td>
<td>Introduction to Theory of Computation</td>
<td>4</td>
</tr>
<tr>
<td>CSE 512</td>
<td>Introduction to Artificial Intelligence</td>
<td>4</td>
</tr>
<tr>
<td>CSE 513</td>
<td>Advanced Artificial Intelligence</td>
<td>4</td>
</tr>
<tr>
<td>CSE 515</td>
<td>Automated Reasoning</td>
<td>4</td>
</tr>
<tr>
<td>CSE 520</td>
<td>Advanced Computer Graphics</td>
<td>4</td>
</tr>
<tr>
<td>CSE 524</td>
<td>Supercomputing and Visualization</td>
<td>4</td>
</tr>
<tr>
<td>CSE 535</td>
<td>Numerical Computation</td>
<td>4</td>
</tr>
<tr>
<td>CSE 550</td>
<td>Advanced Bioinformatics I: Sequence Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CSE 551</td>
<td>Advanced Bioinformatics II: Numerical Modeling</td>
<td>4</td>
</tr>
</tbody>
</table>

Twelve units chosen from:

### Concentration in Economics (40 units) (Program Code: MAEC)

**Lower-division requirements (8)**
- ECON 200 Principles of Microeconomics 4
- ECON 202 Principles of Macroeconomics 4

**Upper-division requirements (12)**
- MATH 320 Mathematical Interest Theory 4
- MATH 565 Mathematical Statistics 4
- MATH 576 Introduction to Mathematical Methods 4

**Electives (20)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 300</td>
<td>Intermediate Macroeconomics</td>
<td>4</td>
</tr>
<tr>
<td>ECON 302</td>
<td>Intermediate Microeconomics</td>
<td>4</td>
</tr>
<tr>
<td>ECON 360</td>
<td>Economics of the Environment</td>
<td>4</td>
</tr>
</tbody>
</table>

Twelve units chosen from:

### Concentration in Geographic Information Systems (48 units) (Program Code: MAGI)

**Lower-division requirements (14)**
- GEOG 103 Physical Geography 5
- GEOG 201 Map Interpretation 4
- GEOG 202 Introduction to Geographic Information Systems and Cartography 4

**Upper-division requirements (14)**
- GEOG 308 Advanced Geographic Information Systems 5
- GEOG 402 Geographic Information Systems Applications 5
- MATH 470 Ordinary Differential Equations 4

**Electives (20)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 306</td>
<td>Remote Sensing of the Environment</td>
<td>8</td>
</tr>
<tr>
<td>GEOG 406</td>
<td>Digital Image Processing</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 575D-E</td>
<td>Internship in Geography</td>
<td>4</td>
</tr>
</tbody>
</table>

Twelve units selected from the following with at least eight units chosen from 500-level courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 320</td>
<td>Mathematical Interest Theory</td>
<td>4</td>
</tr>
<tr>
<td>MATH 455</td>
<td>Fourier Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH 474</td>
<td>Numerical Methods</td>
<td>4</td>
</tr>
<tr>
<td>MATH 480</td>
<td>Topics in History of Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>MATH 485</td>
<td>Differential Geometry</td>
<td>4</td>
</tr>
<tr>
<td>MATH 510</td>
<td>Topics in Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>MATH 529</td>
<td>Advanced Geometry</td>
<td>4</td>
</tr>
<tr>
<td>MATH 531</td>
<td>Advanced Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH 546</td>
<td>Abstract Algebra II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 554</td>
<td>Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 555</td>
<td>Introduction to Point-Set Topology</td>
<td>4</td>
</tr>
<tr>
<td>MATH 557</td>
<td>Complex Variables</td>
<td>4</td>
</tr>
<tr>
<td>MATH 570</td>
<td>Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH 595D</td>
<td>Independent Study</td>
<td>4</td>
</tr>
</tbody>
</table>
Concentration in Physics (49 units) (Program Code: MAPC)

Lower-division requirements (21)
PHYS 221 General Physics I 5
PHYS 222 General Physics II 5
PHYS 223 General Physics III 5
PHYS 224 General Physics IV 3
PHYS 225 General Physics V 3

Upper-division requirement (4)
PHYS 373 Mathematical Methods of Physics I 4

Electives (24)
Twelve units chosen from:
PHYS 306 Classical Mechanics I
PHYS 307 Classical Mechanics II
PHYS 313 Electrodynamics I
PHYS 314 Electrodynamics II
PHYS 315 Introduction to Modern Optics
PHYS 324 Statistical and Thermal Physics
PHYS 370 Introduction to Astrophysics
PHYS 421 Quantum Mechanics I
PHYS 422 Quantum Mechanics II
PHYS 430 Advanced Physics Laboratory
PHYS 450 Solid State Physics
PHYS 461 Introduction to Nuclear Physics
PHYS 463 Introduction to Elementary Particle Physics
PHYS 473 Mathematical Methods of Physics II
PHYS 480A Topics in Classical Physics: Mechanics
PHYS 480B Topics in Classical Physics: Electrodynamics
PHYS 485A Topics in Contemporary Physics
PHYS 573 Mathematical Methods of Physics III

Twelve units of mathematics electives selected from the following with at least one four unit course chosen from 500-level

MATH 320 Mathematical Interest Theory
MATH 455 Fourier Analysis
MATH 470 Ordinary Differential Equations
MATH 474 Numerical Methods
MATH 480 Topics in History of Mathematics
MATH 485 Differential Geometry
MATH 510 Topics in Mathematics
MATH 529 Advanced Geometry
MATH 531 Advanced Linear Algebra
MATH 546 Abstract Algebra II
MATH 554 Analysis II
MATH 555 Introduction to Point-Set Topology
MATH 557 Complex Variables