If you find beauty in the theory of mathematics, learn how the Comprehensive emphasis can prepare you for graduate studies in math and science. Mathematicians can work as university professors, teaching and doing research, or in a variety of scientific fields. The Bachelor of Science or Bachelor of Arts in Mathematics with a Comprehensive emphasis serves as a launching pad for students wishing to attain a graduate degree in mathematics, mathematics education or applied math. Undergraduates immerse themselves in the study of abstract algebra, mathematical analysis and more. They learn to apply rigorous logic and creativity to mathematical problems. In addition, they must complete a minor outside of the Department of Mathematics. Students who major in comprehensive mathematics and another field should be well-prepared for graduate studies in either field.

LEARNING OUTCOMES
- Apply computational methods; Math majors should be able to apply computational methods and mathematical concepts to analyze scientific problems
- Apply mathematical models to current problems; Math majors should be able to critically evaluate and extend selected mathematical models in the current scientific literature.
- Create valid proofs; Students should be able to identify an appropriate proof strategy and almost always able to create a correct proof using multiple strategies as appropriate.
- Define Terms Precisely; Precision is essential in mathematics, and a crucial skill for math majors is to learn to define mathematical terms precisely.
- Effective communication of results; Math majors should be able to effectively communicate results to non-specialized audiences in written and verbal form.
- Recognize valid arguments; Logical rigor is a critical component of mathematical argumentation. We expect math majors to develop the ability to recognize when arguments are valid, and identify logical gaps and flaws.

Undergraduate Graduation Requirements
All course work and requirements for this degree must be completed prior to the date the degree is awarded. The University of Arizona requirements to follow in this audit are required for graduation and awarding of the degree.

Curriculum:
1. The University of Arizona and the Arizona Board of Regents have sole discretion over all curricula changes.
2. Courses, programs & requirements may be suspended, deleted, restricted, or changed in any manner, at any time.
3. Students must remain currently informed about all policies & other info that bears on completing a degree.

Required Units:
Additional units will be required to complete this degree if a student:
A) is admitted to the UA with deficiencies;
B) changes their academic plan(s);
C) fails to meet minimum course/plan requirements;
D) ineffectively plans or fails to execute a course of study that leads directly to degree completion; or
E) Candidates for a second bachelor's degree at The University of Arizona with a different award date than the first must earn no fewer than 30 units of University Credit in addition to the units required for the first degree, and must meet all requirements for the second degree.

The following requirements must be met for graduation.

Units Required and Cumulative GPA
120 units are required at a 2.0 GPA. View the pdf report grid for units earned toward this degree and cumulative GPA.

Completing a second bachelor's degree at The University of Arizona requires no fewer than 30 units in addition to the units required for the first degree, and all requirements for the second degree must be met.

Upper Division Units
Not Satisfied: A minimum of 42 units of upper-division credit are required for this degree.
· **Units:** 42.00 required, 0.00 completed, 42.00 needed

## Units in Residence

Not Satisfied: A minimum of 30 units in residence at The University of Arizona (excluding correspondence credit and credit by exam) is required.

· **Units:** 30.00 required, 0.00 completed, 30.00 needed

## Upper Division Units in Residence

Not Satisfied: A minimum of 18 units of upper division credit in residence at the University of Arizona (excluding correspondence credit and credit by exam) is required.

· **Units:** 18.00 required, 0.00 completed, 18.00 needed

## Correspondence and/or Exam Credit Limit

Satisfied: A maximum of 60 units of Correspondence Credit and/or Exam Credit may apply toward graduation.

· **Units:** 0.00 completed

## Non Degree Seeking Limit

A maximum of 15 units completed as a non-degree seeking student may be used for fulfilling undergraduate degree requirements.

Units exceeding this limit (shown below) must be subtracted from the units required towards the degree and graduation requirements.

## Non-Community College Units

Not Satisfied: Non-Community College Units: While there is no limit to the total number of units of course work that may be transferred from an accredited community college to The University of Arizona, no more than 64 units from a 2-year institution may be applied toward the requirements for a bachelor's degree. Therefore, to reach the required 120 units for a bachelor’s degree, a minimum of 56 units must be completed from 1) coursework at a 4-year institution, 2) approved credit by examination (refer to UA Catalog for approved examinations and scores), or 3) any combination thereof.

· **Units:** 56.00 required, 0.00 completed, 56.00 needed

## Success Course Limit

Satisfied: No more than 3 units will apply toward a student's graduation requirements. All Success courses taken can be seen below. Success Course units exceeding the 3 unit maximum must be subtracted from the total units, residency requirements and cumulative grade point average.

## PE Activity Course Limit

Satisfied: No more than 3 units will apply toward a student's graduation requirements. All PE activity courses taken can be seen below. PE Activity units exceeding the 3 unit maximum must be subtracted from the total units, residency requirements and cumulative grade point average.
**General Education Entry Course**

Not Satisfied: General Education Entry Course

*Introduction to General Education course.*

**Not Satisfied:** Introduces students admitted to the university as First-Year students to General Education, reflecting on learning, and developing an ePortfolio. (1 unit)

- **Units:** 1.00 required, 0.00 completed, 1.00 needed

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**Courses Available**

UNIV 101

**General Education Foundation Mathematics**

Not Satisfied: General Education Foundation Mathematics

**GE Substantial Math Strand**

**Not Satisfied:** Complete 1 course.

**GE Substantial Math Strand**

**Not Satisfied:** Complete 1 course.

- **Units:** 2.67 required, 0.00 completed, 2.67 needed

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**Courses Available**

MATH 122B, MATH 125, MATH 129, MATH 215, MATH 223, MATH 254, MATH 313

**General Education Foundation Composition & Second Language**

Overall Requirement Not Satisfied: Undergraduate General Education Foundation Composition & Second Language

**Foundation Composition**

**Not Satisfied:** Complete 1 of the following 4 Foundation Composition options:
1. 3 Course Foundation Composition Sequence
2. 2 Course Foundation Composition Sequence
3. Honors Composition with grade of C or higher
4. Honors Composition with a grade of D and Second Semester Composition.

Please note: Students who earn a grade of D in Honors Composition may choose to repeat the course in order to earn a higher grade to satisfy the requirement. Please consult with your major advisor.

Mid-Career Writing Assessment - Complete 2nd semester English Composition with a B grade or higher. Students who do not earn a grade of B or better in 2nd semester English Composition must also satisfy a college or department writing requirement. Consult your major advisor if you do not earn a grade of B in 2nd semester English Composition.

Option 1: Foundation Composition - 3 Course Sequence
**Not Satisfied:** Complete 3 courses. Complete ENGL 106 AND ENGL 101/107 AND ENGL 102/108.

- **Courses:** 3.00 required, 0.00 completed, 3.00 needed

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**Courses Available**

ENGL 1EIB, ENGL 101, ENGL 101A, ENGL 107, ENGL 107A, (***) (###), ENGL 102, ENGL 108

**OR Option 2: Foundation Composition - 2 Course Sequence.**

(R532/L20)

- **Not Satisfied:** Complete 2 courses. Complete ENGL 101/107 AND ENGL 102/108

- **Courses:** 2.00 required, 0.00 completed, 2.00 needed

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**Courses Available**

ENGL 1EIB, ENGL 101, ENGL 101A, ENGL 107, ENGL 107A, (***) (###), ENGL 102, ENGL 108

**OR Option 3: Honors Composition**

(R532/L40)

- **Not Satisfied:** Complete 1 course with a C or better.

- **Courses:** 1.00 required, 0.00 completed, 1.00 needed

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**Courses Available**

ENGL 109H

**Foundation Second Language - Second Semester Proficiency**

(R521)

- **Not Satisfied:** Credit will not be given for a course at an equivalent or lower level than prior language credit earned. Course must be taken for a grade, not as pass/fail. Third semester or higher courses used to fulfill this requirement may also be used to fulfill other requirements. A grade of C or higher is required in the course that satisfies the second language requirement.

- **Demonstrate second semester proficiency in a second language by completing a sequence of courses through a second semester or higher level or by passing a language proficiency examination at the second semester level or higher.**

**Second Semester Language Course.**

(R521/L10)

Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

AIS 104B, AIS 307B, ARB 102, CHN 102, CRL 102, FREN 102, FREN 112, GER 102, GRK 102, GRK 104, GRK 112, ITAL 102, ITAL 102Z, JPN 102, JUS 103B, KOR 102, LAS 305A, LAT 102, LAT 112, LING 104B, LING 307B, MENA 103B, PORT 102, PORT 305A, PORT 325A, PRS 102, RSSS 102, SERP 370B, SPAN 102, SPAN 103, SPAN 205, TURK 102

General Education Core Requirements

Overall Requirement Not Satisfied: General Education Core Requirements

GE Exploring Perspectives

Overall Requirement Not Satisfied: Choose one course from each category.

Artist Courses

Not Satisfied: Complete 1 course, 3 units total. Transfer students with quarter system credits may satisfy requirement with 1 course and 2.67 units.

- Units: 2.67 required, 0.00 completed, 2.67 needed
- Courses: 1.00 required, 0.00 completed, 1.00 needed

Courses Available

AFAS 218, AFAS 245, AFAS 373, ARC 160C1, ARC 303, ARH 320, ARH 322, ART 150B2, ART 242, ART 358, DNC 100, DNC 101, DNC 144A, DNC 152C, DNC 178A, DNC 179A, EAS 240, ENGL 201, ENGL 209, ENGL 210, ENGL 215, ENGL 245, ENGL 248B, FREN 245, FREN 284, FREN 373, FTV 352, HNRS 216, HNRS 222, ISTA 401, ITAL 330B, JPN 245, LAS 322, LAS 337, MAS 337, MUS 101A, MUS 109, MUS 328, MUS 337, MUS 360, PAH 150A1, RELI 240, SPAN 160C1, TAR 100, TAR 303

Humanist Courses

Not Satisfied: Complete 1 course, 3 units total. Transfer students with quarter system credits may satisfy requirement with 1 course and 2.67 units.

- Units: 2.67 required, 0.00 completed, 2.67 needed
- Courses: 1.00 required, 0.00 completed, 1.00 needed

Courses Available

AFAS 150B1, AFAS 160A1, AFAS 160D1, AFAS 200, AIS 212, APAS 250, ARH 201, ARH 316B, ARH 329, ART 329, CLAS 160D2, CLAS 329, CLAS 335, EAS 160A1, EAS 160A3, EAS 250, ENGL 160A1, ENGL 160A2, ENGL 265, ENGL 266, ENGL 280, ENGL 300, ENGL 375, FREN 280, FREN 375, FTV 325, FTV 375, GEOG 205, GER 160D1, GER 246,
MATHBS USCNC COMPCOMP


Natural Scientist Courses

Not Satisfied: Complete 1 course, 3 units total. Transfer students with quarter system credits may satisfy requirement with 1 course and 2.67 units.

- Units: 2.67 required, 0.00 completed, 2.67 needed
- Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available


Social Scientist Courses

Not Satisfied: Complete 1 course, 3 units total. Transfer students with quarter system credits may satisfy requirement with 1 course and 2.67 units.

- Units: 2.67 required, 0.00 completed, 2.67 needed
- Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

AED 150A1, AED 408, AFAS 260, AFAS 280, AFAS 376, ANTH 150A1, ANTH 150B1, ANTH 160A1, ANTH 280, ANTH 317, ANTH 339, AREC 210, AREC 217, CLAS 160D3, ECON 200, EDP 150B1, EDP 200, ENGL 160D1, ENGL 322, FIN 150C1, FITS 204, FREN 150B1, FREN 150C1, GEG 150B2, GEG 220, GEG 250, GEG 367, GERO 150A1, GERO 244, GWS 252, GWS 448, GWS 459, HDFS 200, HED 350, HIST 150C1, HIST 150C2, HIST 150C3, HIST 252, HIST 307, HNRS 219, HPS 179, HPS 200, HUMS 376, ITAL 150B1, ITAL 150C1, ITAL 160B1, ITAL 160C1, ITAL 150B1, LAS 150B1, LAS 150B2, LAS 204, LAS 230, LAS 280, LAS 312, LAS 317, LAW 389, LING 320, LING 322, MAS 150B2, MAS 150C1, MAS 317, MAS 365, PA 241, PA 312, PHP 150C, PHP 308, POL 202, POL 204, POL 312, PORT 280, PPEL 210, PSY 101, PSY 150A1, PSY 200, SERP 200, SERP 416, SOC 150B1, SOC 150C2, SOC 222, SOC 241, SOC 260, SOC 324, SOC 325, SOC 367, SOC 448, SOC 459, SPAN 280, TLS 150B1, TLS 150C1, TLS 310, TLS 331

GE Building Connections

Not Satisfied: Building Connections brings together knowledge and modes of thinking from two or more disciplines and/or perspectives. Choose three courses (9 units minimum).

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Building Connections Courses

Not Satisfied: Complete 3 courses, 9 units total. Transfer students with quarter system credits may satisfy requirements with 3 courses and 8.01 units.

- Units: 8.01 required, 0.00 completed, 8.01 needed
- Courses: 3.00 required, 0.00 completed, 3.00 needed
Courses Available


GE 32 unit check

Not Satisfied: Students must complete 32 units in General Education coursework while satisfying the requirements.

Check for 32 units of GE

Not Satisfied: Students must complete 32 units in General Education coursework while satisfying the requirements.

- Units: 32.00 required, 0.00 completed, 32.00 needed

General Education Portfolio

Not Satisfied: General Education Portfolio (Exit Course)
Not Satisfied: Students admitted to the university as First-Year students reflect on their General Education experience and complete their ePortfolio in the GE Capstone course. (1 unit)

- Units: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

UNIV 301

Additional Coursework

Courses listed in this section may include general elective credits, UA courses and transferable courses from other institutions. Consult with your advisor to determine if courses listed in this section may be used to fulfill a requirement or sub-requirement in your degree program.

Courses taken for Pass/Fail option can only count as elective credit. They cannot fulfill any General Education, Major, or Minor requirements.

BS in Mathematics

Overall Requirement Not Satisfied: Will appear fully satisfied when student satisfies Mathematics Supporting Laboratory Science Coursework, Mathematics Application Coursework, Mathematics Computer Science, Math Major Core Requirements, and selects an emphasis. All emphases require a minimum of 15 units of 400-level coursework in the major.

The Bachelor of Science in Mathematics requires the same Core Mathematics courses as the BA; BS students must satisfy specialized supporting laboratory science and application course requirements.

Equivalent MATV courses may be available through UA South. For approved courses consult with your advisor.

Mathematics Supporting Laboratory Science Coursework

Overall Requirement Not Satisfied: Will appear fully satisfied when student has satisfied two of the approved laboratory science courses.

Students seeking a BS in Mathematics must complete 2 of the following requirements. Choose from Chemistry, Physics, Biology, Physiology, and/or Geosciences.

Courses used to fulfill this requirement may also be used to fulfill other requirements.

Chemistry I

Not Satisfied: Complete 4 units from Chemistry 141 & (143 or 145), 151, 161 & 163, or 181

- Units: 4.00 required, 0.00 completed, 4.00 needed

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Courses Available

CHEM 141, CHEM 143, CHEM 145, CHEM 151, CHEM 161, CHEM 163, CHEM 181, Approved Transfer Course

Chemistry II

Not Satisfied: Complete 4 units from Chemistry 142 & (144 or 146), 152, 162 & 164, or 182

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MATH BS USCNC

COMP

Units: 4.00 required, 0.00 completed, 4.00 needed

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Courses Available

CHEM 142, CHEM 144, CHEM 146, CHEM 152, CHEM 162, CHEM 164, Approved Transfer Course

Geosciences

Not Satisfied: Complete 1 course

· Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

GEOS 251

Geosciences

Not Satisfied: Complete 1 course

· Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

GEOS 255, GEOS 302, GEOS 304, GEOS 308, GEOS 322

Biology I

Not Satisfied: Complete 4 units

· Units: 4.00 required, 0.00 completed, 4.00 needed

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Courses Available

MCB 181L, MCB 181R, Approved Transfer Course, MCB 184

Biology II

Not Satisfied: Complete 4 units

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- **Units**: 4.00 required, 0.00 completed, 4.00 needed

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**Courses Available**

ECOL 182L, ECOL 182R, Approved Transfer Course

**Physiology I**

Not Satisfied: Complete 1 course

- **Courses**: 1.00 required, 0.00 completed, 1.00 needed

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**Courses Available**

PSIO 201

Physiology II

Not Satisfied: Complete 1 course

- **Courses**: 1.00 required, 0.00 completed, 1.00 needed

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**Courses Available**

PSIO 202

Introductory Mechanics

Not Satisfied: Complete Introductory Mechanics Lecture with Lab

- **Units**: 4.00 required, 0.00 completed, 4.00 needed

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**Courses Available**

PHYS 139, PHYS 140, PHYS 141, PHYS 161H

Intro Optics and Thermodynamics
Not Satisfied: Complete Introductory Thermodynamics & Optics with Lab

- Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

PHYS 142, PHYS 162H

Introductory Electricity and Magnetism with Lab.

Not Satisfied: Complete Introductory Electricity and Magnetism with Lab

- Units: 4.00 required, 0.00 completed, 4.00 needed

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Courses Available

PHYS 239, PHYS 240, PHYS 241, PHYS 261H

Mathematics Application Coursework

Overall Requirement Not Satisfied: Will appear fully satisfied when student has satisfied 3 units of non-math coursework with a prerequisite or corequisite of at least Calculus I (MATH 122B or higher).

Courses used to fulfill this requirement may also be used to fulfill other requirements.

This requirement does not apply to the Mathematics Education Emphasis.

Courses with Calculus Prerequisite

- Units: 3.00 required, 0.00 completed, 3.00 needed

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Courses Available

Mathematics Supporting Computer Science

Not Satisfied: Will appear fully satisfied when student satisfies Computer Science requirements.

Computer Science

Not Satisfied: Complete 1 course. One of the following courses is recommended for most students: CSC 110, ISTA 130, ECE 175, or CHEE 205; other options may require additional prerequisites and/or a major or minor declared in another subject.

Courses used to fulfill this requirement may also be used to fulfill other requirements.

- Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

- BME 225, CHEE 205, CSC 110, CSC 120, CSC 250, ECE 175, GEOS 280, ISTA 130, MIS 301, NROS 311, PHYS 305

Math Major Core Requirements

Overall Requirement Not Satisfied: Will appear fully satisfied when student satisfies Calculus I and other Core Courses.

Calculus I

Not Satisfied: Complete 1 course

- Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

- MATH 122B, MATH 125

Core Courses

Not Satisfied: Complete 5 courses. Credit allowed for only one course in each pair: MATH 313 or MATV 313, MATH 323 or MATV 323, MATH 355 or MATV 355. MATV courses are only available to UA South students.

- Courses: 5.00 required, 0.00 completed, 5.00 needed

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Courses Available

- MATH 129, MATH 223, MATH 313, MATH 323, MATH 355, MATV 313, MATV 323, MATV 355
Emphasis in Comprehensive Mathematics


Equivalent MATV courses may be available through UA South. For approved courses consult with your advisor.

Comprehensive Emphasis Requirements

Overall Requirement Not Satisfied: Will appear fully satisfied when student satisfies Comprehensive Required Courses and either the sequence in Abstract Algebra or Differential Equations.

Comprehensive Required Courses

Not Satisfied: Complete 4 courses

- Courses: 4.00 required, 0.00 completed, 4.00 needed

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Courses Available

MATH 413, MATH 424, MATH 425A, MATH 425B

Option 1: Abstract Algebra

Not Satisfied: Complete MATH 415A and MATH 415B

- Courses: 2.00 required, 0.00 completed, 2.00 needed

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Courses Available

MATH 415A, MATH 415B

OR Option 2: Differential Equations

Not Satisfied: OR Complete MATH 454 and MATH 456

- Courses: 2.00 required, 0.00 completed, 2.00 needed

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Courses Available

MATH 454, MATH 456
Major 400-level Upper Division

Not Satisfied: A minimum of 15 units of 400-level upper-division major coursework must be completed.

- Units: 15.00 required, 0.00 completed, 15.00 needed

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Comprehensive Math Emphasis Graduation Requirements

Overall Requirement Not Satisfied: Will appear fully satisfied when student satisfies Mid Career Writing Assessment, Major GPA, Residency requirement, and Major Upper Division unit requirement.

Mid Career Writing Assessment

Not Satisfied: Complete 2nd semester English Composition with a B grade or higher. Students who do not earn a grade of B or higher in 2nd semester English Composition must also satisfy a college or department writing requirement. Consult your major advisor if you do not earn a grade of B or higher in 2nd semester English Composition.

- Courses: 1.00 required, 0.00 completed, 1.00 needed

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Major GPA

Satisfied: A minimum 2.0 GPA is required in the major coursework.

- GPA: 2.000 required, 0.000 completed

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Major Units

Not Satisfied: A minimum of 37 units must be completed in the major.

- Units: 37.00 required, 0.00 completed, 37.00 needed

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**Major Residency:**

**Not Satisfied:** A minimum of 18 units in the major must be taken at the University of Arizona.

- **Units:** 18.00 required, 0.00 completed, 18.00 needed

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**Major Upper Division**

**Not Satisfied:** A minimum of 21 units of upper-division major coursework must be completed.

- **Units:** 21.00 required, 0.00 completed, 21.00 needed

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**Minor Required**

**Not Satisfied:** A minor outside of the Mathematics Department is required for this major. Consult with your advisor to select a minor or discuss other options such as selecting a second major.