If you are aspiring to earn a graduate degree or work in computer science, learn how this math degree can position you for in-demand careers. Computer scientists improve lives through the advancement and development of technology. Students earning a Bachelor of Science or Bachelor of Arts in Mathematics with a Computer Science emphasis are immersed in core mathematics coursework, as well as more specialized courses focusing on the logic and concepts underpinning advances in computer science. They are required to complete a minor or second major in Computer Science, as well. This major is a natural lead-in to various graduate programs and careers in everything from mobile app creation and front- and back-end web development to machine learning and data security. Computer scientists are in high demand in both public and private sectors to conceptualize, strategize and build technology solutions.

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


- 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, ENGL 106

OR Option 2: Foundation Composition - 2 Course Sequence

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

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 - Fourth Semester Proficiency

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 for pass/fail.

Demonstrate fourth semester proficiency in a second language by completing one of the following:
1. Complete a Fourth Semester Language Course with a grade of C or higher.
2. Complete Arabic 401 and 1 course with a grade of C of higher from Arabic 424B, 427B or 430B.
3. Pass a language proficiency examination at the fourth semester level

Option 1: Fourth Semester Language Course

Not Satisfied: Complete 1 course with a grade of C or better.

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**


**OR Option 2: Arabic Language**

Not Satisfied: Complete ARB 401, Intermediate Arabic, plus one additional course from ARB 424B, 427B, 439B, 484B.

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

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**Courses Available**

ARB 401

**AND Option 2: Additional Arabic Courses**

Not Satisfied: Complete one additional course with a grade of C or better from ARB 424B, 427B, 439B, 484B.

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

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**Courses Available**

ARB 424B, ARB 427B, ARB 439B, ARB 484B

**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

### Terms

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### Courses Available

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<td>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 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</td>
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</table>

**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

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### Courses Available

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**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

### Terms

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### Courses Available

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<td>AGTM 170A1, ANTH 160D2, ANTH 170C1, ANTH 261, ASTR 170B1, ASTR 206, ATMO 170A1, BE 170A1, BE 170A2, CHEM 151, CHEM 152, CHEM 161, CHEM 162, ECOL 170C1, ECOL 170C2, ENVS 170A1, ESOC 210, GC 170A1, GEOG 230, GEOS 170B1, GEOS 212, GEOS 218, GEOS 220, HWRS 170A1, MFS 220, NSE 170C1, NSE 375, PHYS 141, PHYS 161H, PLS 170C1, PLS 170C2, PLS 307, PTYS 206, RNR 170C1</td>
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</table>

**Social Scientist Courses**

(R16656/L130)
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, GEOG 150B2, GEOG 222, GEOG 250, GEOG 367, GER 150A1, GER 244, GWS 252, GWS 448, GWS 459, HDFS 200, HED 350, HIST 150C1, HIST 150C2, HIST 150C3, HIST 252, HIST 307, HNRS 219, HPS 178, HPS 200, HUMS 376, ITAL 150A1, ITAL 150B1, ITAL 150B2, ITAL 230, ITAL 231, ITAL 232, INTR 325, 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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### 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

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General Education Portfolio

Not Satisfied: General Education Portfolio (Exit Course)

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.

BA in Mathematics

Overall Requirement Not Satisfied: Will appear fully satisfied when student satisfies Mathematics Supporting Computer Science, Math Major Core Requirements, and selects an emphasis. All emphases require a minimum of 15 units of 400-level coursework in
Equivalent MATV courses may be available through UA South. For approved courses consult with your advisor.

**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 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 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 Computer Science Mathematics

Overall Requirement Not Satisfied: Will appear fully satisfied when student satisfies Computer Science Emphasis course requirements, Graduation Requirements, and declares a minor in Computer Science.

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

Computer Science Emphasis Options

Not Satisfied: Will appear fully satisfied when student satisfies Option 1, 2, OR 3.

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: Probability and Statistics

Not Satisfied: OR Complete MATH 464 and MATH 466

· Courses: 2.00 required, 0.00 completed, 2.00 needed

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<th>Term</th>
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Courses Available

MATH 464, MATH 466

OR Option 3: Numerical Analysis

Not Satisfied: OR Complete MATH 475A

· Courses: 1.00 required, 0.00 completed, 1.00 needed

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Courses Available

MATH 475A

Courses Available

MATH 475A
AND Option 3: Courses to Pair With Numerical Analysis

**Not Satisfied:** Complete MATH 475A and one course from MATH 422, 424, 454, 456, 464, 475B, 485

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

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**Courses Available**

MATH 422, MATH 424, MATH 454, MATH 456, MATH 464, MATH 475B, MATH 485

**Computer Science Emphasis Requirements**

**Overall Requirement Not Satisfied:** Will appear fully satisfied when student satisfies two of the electives, and one advisor approved course.

**Electives**

**Not Satisfied:** Complete 2 courses

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

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**Courses Available**

CSC 473, MATH 413, MATH 443, MATH 445, MATH 446, MATH 447

**Advisor Approved Course**

**Not Satisfied:** Complete one 400-level MATH course in consultation with your math faculty advisor. You may choose from the pre-approved list. If you prefer to select another course, you may do so ONLY if approved by your math faculty advisor.

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

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**Courses Available**

CSC 401A, CSC 401B, CSC 473, DATA 412, DATA 468, MATH 401A, MATH 401B, MATH 402, MATH 412, MATH 413, MATH 415A, MATH 443, MATH 445, MATH 446, MATH 447, MATH 464, MATH 468, MATH 475A, MATH 485, PHIL 401A, PHIL 401B

**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

| Term | Subject | Catalog Nbr | Course Title | Grade | Units | RptCd | RqDes | Type |
### Computer Science 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

#### Major GPA

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

- **GPA:** 2.000 required, 0.000 completed

#### Major Units

**Not Satisfied:** A minimum of 34 units must be completed in the major.

- **Units:** 34.00 required, 0.00 completed, 34.00 needed

#### 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 18 units of upper-division major coursework must be completed.

· Units: 18.00 required, 0.00 completed, 18.00 needed

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Minor Required
Not Satisfied: A minor is required for this major.

You must complete 1 of the following:
Computer Science Minor
Computer Science Major
Computer Science Major (Secondary)