Department of Mathematics

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Faculty

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Introduction

The department offers programs of study leading to the BA, MA, MS and PhD degrees with a major in mathematics, and the BSMTH. It also offers minors in mathematics and statistics, and undergraduate academic certificates in statistics and actuarial science, the latter in cooperation with the College of Business and the Department of Economics. Its faculty is dedicated to excellence in scholarship and teaching. The faculty supports a strong program of instruction and research, having as its core a solid foundation of mathematical theory that furnishes the tools necessary to address and solve crucial problems in maintaining, improving and protecting the world. The program also promulgates mathematics as a discipline in its own right, a body of pure knowledge with exceptional power, enabling its practitioners and those who diligently study it to be adaptable and effective forces in the workplace.

Students who earn degrees in mathematics readily obtain jobs with high-technology companies and in business, industry, government and teaching. Salaries and working conditions compare with those of engineers and scientists.

Students who plan to major in mathematics, physics, chemistry, biology or computer science should have had four years of mathematics in high school, including pre-calculus. Students who are required to take mathematics as part of their degree program in college should have had at least two years of algebra and one year of geometry in high school.

Required Placement and Testing

The Department of Mathematics enforces prerequisites for MATH 1100, MATH 1190, MATH 1350, MATH 1400, MATH 1600, MATH 1610, MATH 1650 and MATH 1710. Students not meeting prerequisites for courses in which they enroll are required to drop the course or face academic penalty.

New students will receive notification of placement in mathematics from the Office of Admissions. Placement is based on materials submitted for admission to UNT including SAT/ACT scores and class rank. Enrollment in mathematics courses beyond the initial placement will depend upon the score on the ACCUPLACER College-Level Mathematics Test.

For more information about placement procedures, please contact the mathematics advising office at 940-565-4045.

Prerequisites

MATH 1190, MATH 1350, MATH 1400, MATH 1600, MATH 1650: MATH 1100 or equivalent with grade of C or better, or UNT mathematics department approval.

Programs of Study

The department offers undergraduate and graduate programs in the following areas:

- Bachelor of Arts,
- Master of Arts,
- Master of Science, and
- Doctor of Philosophy, all with a major in mathematics; and
- Bachelor of Science in Mathematics.

Bachelor of Arts with a Major in Mathematics (Non-Teacher Certification)

Degree Requirements

1. **Hours Required and General/College Requirements:** A minimum of 120 semester hours, of which 42 must be advanced, and fulfillment of degree requirements for the Bachelor of Arts degree as specified in the "General University Requirements" in the Academics section of this catalog and the College of Arts and Sciences requirements. The department suggests ENGL 1310 and TECM 2700 for satisfying the English Composition and Rhetoric core requirements.

2. **Major Requirements:** 34 hours of mathematics courses, which must include:

   a. Mathematics Core (16 hours): MATH 1710, MATH 1720, MATH 2700, MATH 2730 and MATH 3000.

b. At least one of MATH 3510 or MATH 3610 must be taken in satisfying other requirements.

c. Depth Requirement (6 hours): One of the following areas:

• Analysis: two of the following: MATH 3350, MATH 3410, MATH 3420, MATH 3610, MATH 3740, MATH 4100, MATH 4200, MATH 4520.

• Algebra: two of the following: MATH 3400, MATH 3510, MATH 3520, MATH 4430, MATH 4450.

• Probability/Statistics: two of the following: MATH 3680, MATH 4610, MATH 4650.

• Geometry/Topology: two of the following: MATH 3740, MATH 4060, MATH 4500.

d. Breadth Requirement (9 hours): One course in each of the three areas not used to satisfy the depth requirement.

e. Mathematics elective (3 hours): One additional upper-level mathematics course numbered 3350 or higher.

3. **Other Course Requirements:**

a. Three laboratory science courses intended for science majors are required, as follows:

Option I

i. BIOL 1710/BIOL 1730.

ii. One course from PHYS 1710/PHYS 1730 or CHEM 1410/CHEM 1430.

iii. One additional course from: BIOL 1720/BIOL 1740, CHEM 1410/CHEM 1430, CHEM 1420/ CHEM 1440, PHYS 1710/PHYS 1730 or PHYS 2220/PHYS 2240. Equivalent honors courses can also be used to satisfy this requirement.

Mathematics majors with a minor in geography or geology may also choose GEOL 1610 and GEOG 1710 in parts (i) and (iii) above.

Option II

Students double majoring in mathematics and another discipline (typically biology, chemistry, physics or engineering) that requires at least 12 hours of laboratory science intended for science and engineering majors may use the same laboratory science courses that satisfy the requirements for the other major to satisfy the laboratory science requirement for the mathematics major.

b. Proficiency in a foreign language equivalent to 2050 is required. Students intending to pursue a graduate degree in mathematics are encouraged to study French, German or Russian.

c. Computer Programming: CSCE 1020 or CSCE 1030 is required. Students taking mathematics courses at the 2000-level or above are expected to be competent in computer programming, using languages such as BASIC, C, C++, Fortran, PASCAL or Java. Students are encouraged to complete the programming requirement during their freshman or sophomore year. Students who have acquired a solid programming competency in a non-academic setting, such as through work experience, may demonstrate their programming competency by passing a departmental exam in place of the CSCE 1020 or CSCE 1030 course requirement.

4. **GPA:** Students must achieve at least a 2.0 GPA in all mathematics courses above 3350.

5. **Minor Requirements:** One of the following is required:

a. A minor of at least 18 hours (6 advanced). A minor in statistics does not fulfill this requirement.

b. Completion of a second major in addition to mathematics.

c. Completion of the certificate program in actuarial science. Students must take MATH 3680, MATH 4610 and MATH 4650 for fulfilling degree requirements; students are also encouraged to take MATH 3350 and MATH 3740. No mathematics courses may be chosen for fulfilling the elective requirements of the certificate program.

BA with a Major in Mathematics (Non-Teacher Certification)

The following four-year plan is one example of a variety of ways in which you can complete your chosen degree in four years, and will serve as guide for you to design your pathway to degree completion. Variations will depend on whether you need to take prerequisites or have college credit from exams or dual enrollment.

The College of Arts and Sciences expects you to have completed the State recommended high school program and be ready to enroll for Language 2040 or a mathematics course above college algebra. If you are not prepared for this level, the necessary prerequisites will either replace electives or increase the hours required for the degree.

FRESHMAN YEAR

FALL	HOURS
ENGL 1310, College Writing I, or ENGL 1313, Computer Assisted College Writing I*	3
LANG 2040, Foreign Language (intermediate, may be used to satisfy a portion of the Understanding the Human Community requirement)**	3
MATH 1710, Calculus I**	4
PSCI 1040, American Government*	3
Humanities*	3
Total	16

SPRING   **HOURS**
CSCE 1020, Program Development, or
   CSCE 1030, Computer Science I (see major
   requirements)   4
LANG 2050, Foreign Language (intermediate,
   may be used to satisfy a portion of the
   Understanding the Human Community
   requirement)**   3
MATH 1720, Calculus II   3
TECM 2700, Technical Writing
   (recommended)*   3
Laboratory Science
   (see major requirements)**   3–4
Total   16–17

SOPHOMORE YEAR
   FALL   **HOURS**
HIST 2610, United States History to 1865*   3
MATH 2700, Linear Algebra and Vector
   Geometry   3
MATH 2730, Multivariable Calculus   3
Laboratory Science
   (see major requirement)**   3-4
Visual and Performing Arts*   3
Total   15-16

   SPRING   **HOURS**
HIST 2620, United States History Since 1865*   3
MATH 3000, Real Analysis I   3
MATH Depth requirement
   (advanced, see major requirements)   3
Laboratory Science
   (see major requirements)**   3–4
Minor   3
Total   15–16

JUNIOR YEAR
   FALL   **HOURS**
MATH 3510, Introduction to Abstract
   Algebra I, or MATH 3610, Real Analysis II
   (see major requirements)   3
MATH Depth requirement
   (advanced, see major requirements)   3
PSCI 1050, American Government*   3
Minor   3
Minor   3
Total   15

   SPRING   **HOURS**
MATH Depth requirement
   (advanced, see major requirements)   3
Elective   3
Minor   3
Minor (advanced)   3
Social and Behavioral Sciences*   3
Total   15

SENIOR YEAR
   FALL   **HOURS**
MATH Breadth requirement
   (advanced, see major requirements)   3
MATH Breadth requirement (advanced, see
   major requirements)   3
Elective (advanced)   3
Elective   3
Minor (advanced)   3
Total   15

   SPRING   **HOURS**
MATH Elective (3350 or higher)   3
Elective (advanced)   3
Elective (advanced)   3
Elective (advanced)   3
Total   12

*See the University Core Curriculum section of this catalog for approved list of course options.
** See Arts and Sciences degree requirements section of this catalog for approved list of course options.

Actual degree audits may vary depending on availability of courses in a given semester.
Some courses may require prerequisites not listed.
Students may wish to use opportunities for electives to complete a minor of their choice or secondary education courses for teacher certification.

Bachelor of Arts with a Major in Mathematics (Teacher Certification)

Completion of these course requirements does not guarantee the student's certification. For information about additional certification requirements, consult the Teach North Texas academic advisor.

Degree Requirements

1. **Hours Required and General/College Requirements:** A minimum of 120 semester hours, of which 42 must be advanced, and fulfillment of degree requirements for the Bachelor of Arts degree as specified in the "General University Requirements" in the Academics section of this catalog and the College of Arts and Sciences requirements. The department suggests ENGL 1310 and TECM 2700 for satisfying the English Composition and Rhetoric core requirements.

2. **Major Requirements:** 37 hours of mathematics courses, which must include:

   a. Mathematics Core (16 hours): MATH 1710, MATH 1720, MATH 2700, MATH 2730 and MATH 3000.

   b. Secondary Teacher Preparation (12 hours): MATH 2100, MATH 3680, MATH 4050 and MATH 4060.

c.   Analysis (3 hours): One of the following: MATH 3350, MATH 3410, MATH 3420, MATH 3610, MATH 3740, MATH 4100, MATH 4200 or MATH 4520.

d.   Algebra (3 hours): One of the following: MATH 3400, MATH 3510, MATH 3520, MATH 4430 and MATH 4450.

e.   Elective (3 hours): One additional upper-level mathematics course numbered 3350 or higher. Recommended courses are MATH 3400, MATH 3410, MATH 3740, MATH 4450 and MATH 4610.

f.   At least one of MATH 3510 or MATH 3610 must be taken in satisfying other requirements.

3. **Other Course Requirements**:

a.   Three laboratory science courses intended for science majors are required, as follows:

(i) Two courses from the following list: BIOL 1710/BIOL 1730, BIOL 1720/BIOL 1740, CHEM 1410/CHEM 1430, CHEM 1420/CHEM 1440, PHYS 1710/PHYS 1730, PHYS 2220/ PHYS 2240.

(ii) One course from BIOL 4700, CHEM 4700 and PHYS 4700. Students who take BIOL 1710/BIOL 1730 and BIOL 1720/BIOL 1740 in fulfilling the above requirements must enroll in either CHEM 4700 or PHYS 4700. Students who take either CHEM 1410/CHEM 1430 and CHEM 1420/CHEM 1440 or else PHYS 1710/ PHYS 1730 and PHYS 2220/PHYS 2240 must enroll in BIOL 4700.

Equivalent honors courses can also be used to satisfy this requirement. Students seeking certification in both math and physics are required to take PHYS 1710/PHYS 1730, PHYS 2220/ PHYS 2240, and PHYS 3010/PHYS 3030.

b.   Proficiency in a foreign language equivalent to 2050 is required; students are encouraged to choose Spanish for the foreign language requirement.

c.   Computer Programming: CSCE 1020 or CSCE 1030 is required. Students taking mathematics courses at the 2000-level or above are expected to be competent in computer programming, using languages such as BASIC, C, C++, Fortran, PASCAL or Java. Students are encouraged to complete the programming requirement during their freshman or sophomore year. Students who have acquired a solid programming competency in a non-academic setting, such as through work experience, may demonstrate their programming competency by passing a departmental exam in place of the CSCE 1020 or CSCE 1030 course requirement.

4. **GPA:** Students must achieve at least a 2.0 GPA in all mathematics courses above 3350.

5. **Minor Requirement:** A minor in mathematics and science secondary teaching, administered by Teach North Texas, is required.

BA with a Major in Mathematics (Teacher Certification)

The following four-year plan is one example of a variety of ways in which you can complete your chosen degree in four years, and will serve as guide for you to design your pathway to degree completion. Variations will depend on whether you need to take prerequisites or have college credit from exams or dual enrollment.

The College of Arts and Sciences expects you to have completed the State recommended high school program and be ready to enroll for Language 2040 or a mathematics course above college algebra. If you are not prepared for this level, the necessary prerequisites will either replace electives or increase the hours required for the degree.

FRESHMAN YEAR

FALL	HOURS
CSCE 1020, Program Development, or CSCE 1030, Computer Science I (see major requirements)	4
ENGL 1310, College Writing I, or ENGL 1313, Computer Assisted College Writing I*	3
LANG 2040, Foreign Language (intermediate, may be used to satisfy a portion of the Understanding the Human Community requirement)**	3
MATH 1710, Calculus I**	4
TNTX 1100, Secondary Teacher Education Preparation I: Inquiry Approaches to Teaching	1
Total	15

SPRING	HOURS
BIOL 1710/BIOL 1730, Principles of Biology I and Laboratory	4
LANG 2050, Foreign Language (intermediate, may be used to satisfy a portion of the Understanding the Human Community requirement)**	3
MATH 1720, Calculus II	3
MATH 2100, Functions and Modeling for Secondary Mathematics Instruction	3
TECM 2700, Technical Writing*	3
TNTX 1200, Secondary Teacher Education Preparation II: Inquiry-Based Lesson Design	1
Total	17

SOPHOMORE YEAR

FALL	HOURS
CHEM 1410/CHEM 1430, General Chemistry for Science Majors and Laboratory, or PHYS 1710/PHYS 1730, General Technical Physics and Laboratory (PHYS 1710/PHYS 1730 required for MATH/PHYS certification)	4
EDSE 3500, Knowing and Learning in Mathematics and Science	3
MATH 2700, Linear Algebra and Vector Geometry	3
MATH 2730, Multivariable Calculus	3
PSCI 1040, American Government*	3
Total	16

SPRING	HOURS
EDSE 4000, Classroom Interactions	3
MATH 3000, Real Analysis I	3
MATH 3680, Applied Statistics	3
PSCI 1050, American Government*	3
Visual and Performing Arts*	3
Total	15

JUNIOR YEAR

FALL	HOURS
HIST 2610, United States History to 1865*	3
MATH 3510, Introduction to Abstract Algebra I, or MATH 3610, Real Analysis II (see major requirements)	3
MATH analysis or algebra requirement (advanced, see major requirements)	3
Elective or PHYS 2220/PHYS 2240, Electricity and Magnetism and Laboratory (required for MATH/PHYS certification)	3–4
Social and Behavioral Science*	3
Total	15–16

SPRING	HOURS
HIST 2620, United States History Since 1865*	3
MATH 4050, Advanced Study of the Secondary Mathematics Curriculum	3
MATH 4060, Foundations of Geometry	3
PHIL 2600, Ethics in Science	3
Elective or PHYS 3010/PHYS 3030, Modern Physics and Laboratory (required for MATH/PHYS certification)	3–4
Total	15–16

SENIOR YEAR

FALL	HOURS
BIOL 4700, Procedures and Materials for Science Instruction, or CHEM 4700, Procedures and Materials for Science Instruction, or PHYS 4700, Procedures and Materials for Science Instruction	3
EDSE 4500, Project-Based Instruction	3
MATH elective (3350 or higher)	3
Elective	3

	HOURS
Elective	2
Humanities*	3
Total	17

SPRING	HOURS
EDSE 4128, Student Teaching Seminar	1
EDSE 4608/EDSE 4618, Student Teaching I and II in Mathematics and Science	6
Elective	3
Total	10

*See the University Core Curriculum section of this catalog for approved list of course options.
** See Arts and Sciences degree requirements section of this catalog for approved list of course options. Actual degree audits may vary depending on availability of courses in a given semester.
Some courses may require prerequisites not listed.

Bachelor of Science in Mathematics (Non-Teacher Certification)

Degree Requirements

1. **Hours Required and General/College Requirements:** A minimum of 120 semester hours, of which 42 must be advanced, and fulfillment of degree requirements for the Bachelor of Science degree as specified in the "General University Requirements" in the Academics section of this catalog and the College of Arts and Sciences requirements. The department suggests ENGL 1300 and TECM 2700 for satisfying the English Composition and Rhetoric core requirements.

2. **Major Requirements:** 40 hours of mathematics courses, which must include:

a. Mathematics Core (16 hours): MATH 1710, MATH 1720, MATH 2700, MATH 2730 and MATH 3000.

b. At least one of MATH 3510 or MATH 3610 must be taken in satisfying other requirements.

c. Depth Requirement (9 hours): One of the following areas:

- Analysis: MATH 3610 and two of the following: MATH 3350, MATH 3410, MATH 3420, MATH 3740, MATH 4100, MATH 4200, MATH 4520.
- Algebra: MATH 3510 and two of the following: MATH 3400, MATH 3520, MATH 4430, MATH 4450.
- Probability/Statistics: MATH 3680, MATH 4610 and MATH 4650.
- Geometry/Topology: MATH 3740, MATH 4060 and MATH 4500.

d. Breadth Requirement (9 hours): One course in each of the three areas not used to satisfy the depth requirement.

e.   Mathematics elective (6 hours): Two additional upper-level mathematics courses numbered 3350 or above.

3. **Other Course Requirements:**

a. Three laboratory science courses intended for science majors are required as follows:

Option I. Biology Emphasis
- both BIOL 1710/BIOL 1730 and BIOL 1720/ BIOL 1740; and
- one of PHYS 1710/PHYS 1730 or CHEM 1410/ CHEM 1430.

Option II. Chemistry Emphasis
- both CHEM 1410/CHEM 1430 and CHEM 1420/CHEM 1440; and
- BIOL 1710/BIOL 1730.

Option III. Physics Emphasis
- both PHYS 1710/PHYS 1730 and PHYS 2220/ PHYS 2240; and
- BIOL 1710/BIOL 1730.

Option IV. Students double majoring in mathematics and another discipline (typically biology, chemistry, physics or engineering) that requires at least 12 hours of laboratory science intended for science and engineering majors may use the same laboratory science courses that satisfy the requirements for the other major to satisfy the laboratory science requirement for the mathematics major.

Option V. Students with a minor in geography or geology may use GEOL 1610, GEOL 1710, and either PHYS 1710/PHYS 1730 or CHEM 1410/ CHEM 1430 to satisfy the laboratory science requirement for the mathematics major.

b. **Foreign Language Requirement:** Students may complete either of two options to satisfy the College of Arts and Sciences foreign language requirement:

Option I: Proficiency in a foreign language equivalent to 1020 is required. Students intending to pursue a graduate degree in mathematics are encouraged to study French, German or Russian.

Option II: Complete 6 hours of technical writing courses from the following: TECM 2700, TECM 4180, TECM 4190 and TECM 4250.

c. Computer Programming: CSCE 1020 or CSCE 1030 is required. Students taking mathematics courses at the 2000-level or above are expected to be competent in computer programming, using languages such as BASIC, C, C++, Fortran, PASCAL or Java. Students are encouraged to complete the programming requirement during their freshman or sophomore year. Students who have acquired a solid programming competency in a non-academic setting, such as through work experience, may demonstrate their programming competency by passing a departmental exam in place of the CSCE 1020 or CSCE 1030 course requirement.

4. **GPA:** Students must achieve a grade point average of at least 2.0 in all mathematics courses above 3350.

5. **Minor Requirements:** One of the following is required:

a. A minor of at least 18 hours (6 advanced). A minor in statistics does not fulfill this requirement.

b. Completion of a second major in addition to mathematics.

c. Completion of the certificate program in actuarial science. Students must take MATH 3680, MATH 4610 and MATH 4650 for fulfilling degree requirements; students are also encouraged to take MATH 3350 and MATH 3740. Also, no mathematics courses may be chosen for fulfilling the elective requirements of the certificate program.

BS in Mathematics (Non-Teacher Certification) Language Option II

The following four-year plan is one example of a variety of ways in which you can complete your chosen degree in four years, and will serve as guide for you to design your pathway to degree completion. Variations will depend on whether you need to take prerequisites or have college credit from exams or dual enrollment.

The College of Arts and Sciences expects you to have completed the State recommended high school program and be ready to enroll for Language 2040 or a mathematics course above college algebra. If you are not prepared for this level, the necessary prerequisites will either replace electives or increase the hours required for the degree.

FRESHMAN YEAR

FALL	HOURS
ENGL 1310, College Writing I, or ENGL 1313, Computer Assisted College Writing II*	3
MATH 1710, Calculus I	4
PSCI 1040, American Government*	3
Humanities*	3
Understanding the Human Community*	3
Total	16

SPRING	HOURS
CSCE 1020, Program Development, or CSCE 1030, Computer Science I (see major requirements)	4
ENGL Composition II requirement (TECM 2700, Technical Writing recommended)*	3
MATH 1720, Calculus II	3
PSCI 1050, American Government*	3
Understanding the Human Community*	3
Total	16

SOPHOMORE YEAR

FALL	HOURS
HIST 2610, United States History to 1865*	3
MATH 2700, Linear Algebra and Vector Geometry	3
MATH 2730, Multivariable Calculus	3
Laboratory Science (see major requirements)**	3–4
Minor	3
Total	15–16

SPRING	HOURS
HIST 2620, United States History Since 1865*	3
MATH 3000, Real Analysis I	3
MATH Breadth or Depth (advanced, see major requirements)	3
Laboratory Science (see major requirements)**	4
Minor	3
Total	16

JUNIOR YEAR

FALL	HOURS
MATH 3510, Introduction to Abstract Algebra I, or MATH 3610, Real Analysis II (see major requirements)	3
MATH Breadth or Depth requirement (advanced, see major requirements)	3
Laboratory Science (see major requirements)**	4
Minor	3
Minor	3
Total	16

SPRING	HOURS
MATH Breadth or Depth requirement (advanced, see major requirements)	3
MATH Breadth or Depth requirement (advanced, see major requirements)	3
Minor (advanced)	3
Minor (advanced)	3
Social and Behavioral Sciences	3
Total	15

SENIOR YEAR

FALL	HOURS
MATH Breadth or Depth requirement (advanced, see major requirements)	3
MATH Elective (3350 or higher)	3
Elective (advanced)	3
Elective	3
Visual and Performing Arts (advanced)*	3
Total	15

SPRING	HOURS
MATH Elective (3350 or higher)	3
Elective (advanced)	3
Elective	3
Technical Writing Elective (advanced, see major requirements)	3
Total	12

*See the University Core Curriculum section of this catalog for approved list of course options.
** See Arts and Sciences degree requirements section of this catalog for approved list of course options.

Actual degree audits may vary depending on availability of courses in a given semester.
Some courses may require prerequisites not listed. Students may wish to use opportunities for electives to complete a minor of their choice or secondary education courses for teacher certification.

Bachelor of Science in Mathematics (Teacher Certification)
Degree Requirements

Completion of these course requirements does not guarantee the student's certification. For information about additional certification requirements, consult the Teach North Texas academic advisor.

1. **Hours Required and General/College Requirements:** A minimum of 120 semester hours, of which 42 must be advanced, and fulfillment of degree requirements for the Bachelor of Science degree as specified in the "General University Requirements" in the Academics section of this catalog and the College of Arts and Sciences requirements. The department suggests ENGL 1300 and TECM 2700 for satisfying the English Composition and Rhetoric core requirements.

2. **Major Requirements:** 43 hours of mathematics courses, which must include:

   a. Mathematics Core (16 hours): MATH 1710, MATH 1720, MATH 2700, MATH 2730 and MATH 3000.

   b. Secondary Teacher Preparation (12 hours): MATH 2100, MATH 3680, MATH 4050 and MATH 4060.

   c. Analysis (3 hours): One of the following: MATH 3350, MATH 3410, MATH 3420, MATH 3610, MATH 3740, MATH 4100, MATH 4200, MATH 4520.

   d. Algebra (3 hours): One of the following: MATH 3400, MATH 3510, MATH 3520, MATH 4430, MATH 4450.

   e. Elective (9 hours): Three additional upper-level mathematics courses numbered 3350 or higher. Recommended courses are MATH 3400, MATH 3410, MATH 3740, MATH 4450, MATH 4610 and MATH 4650.

   f. At least one of MATH 3510 or MATH 3610 must be taken in satisfying other requirements.

3. **Other Course Requirements:**

a. Three laboratory science courses are required as follows:

Option I: BIOL 1710/BIOL 1730, BIOL 1720/BIOL 1740 and BIOL 4700.

Option II: CHEM 1410/CHEM 1430, CHEM 1420/CHEM 1440 and CHEM 4700.

Option III: PHYS 1710/PHYS 1730, PHYS 2220/PHYS 2240 and PHYS 4700. Students seeking certification in both mathematics and physics are required both to use this option and to also take PHYS 3010/PHYS 3030.

b. **Foreign Language Requirement**: Students may complete either of two options to satisfy the College of Arts and Sciences foreign language requirement:

Option I: Proficiency in a foreign language equivalent to 1020 is required. Students are encouraged to choose Spanish for the foreign language requirement.

Option II: Complete 6 hours of technical writing courses from the following: TECM 2700, TECM 4180, TECM 4190 and TECM 4250.

c. **Computer Programming:** CSCE 1020 or CSCE 1030 is required. Students taking mathematics courses at the 2000 level or above are expected to be competent in computer programming, using languages such as BASIC, C, C++, Fortran, PASCAL or Java. Students are encouraged to complete the programming requirement during their freshman or sophomore year. Students who have acquired a solid programming competency in a non-academic setting, such as through work experience, may demonstrate their programming competency by passing a departmental exam in place of the CSCE 1020 or CSCE 1030 course requirement.

4. **GPA:** Students must achieve a grade point average of at least 2.0 in all mathematics courses above 3350.

5. **Minor Requirements:** A minor in mathematics and science secondary teaching, administered by Teach North Texas, is required.

BS in Mathematics
(Teacher Certification)

The following four-year plan is one example of a variety of ways in which you can complete your chosen degree in four years, and will serve as guide for you to design your pathway to degree completion. Variations will depend on whether you need to take prerequisites or have college credit from exams or dual enrollment.

The College of Arts and Sciences expects you to have completed the State recommended high school program and be ready to enroll for Language 2040 or a mathematics course above college algebra. If you are not prepared for this level, the necessary prerequisites will either replace electives or increase the hours required for the degree.

FRESHMAN YEAR

FALL	HOURS
CSCE 1020, Program Development, or CSCE 1030, Computer Science I (see major requirements)	4
ENGL 1310, College Writing I, or ENGL 1313, Computer Assisted College Writing I*	3
PSCI 1040, American Government*	3
MATH 1710, Calculus I**	4
TNTX 1100, Secondary Teacher Education Preparation I: Inquiry Approaches to Teaching	1
Total	15

SPRING	HOURS
MATH 1720, Calculus II	3
MATH 2100, Functions and Modeling for Secondary Mathematics Instruction	3
PSCI 1050, American Government*	3
TECM 2700, Technical Writing*	3
TNTX 1200, Secondary Teacher Education Preparation II: Inquiry-Based Lesson Design	1
Laboratory Science (see major requirements)** or PHYS 1710/PHYS 1730, General Technical Physics and Laboratory (required for MATH/PHYS certification)	4
Total	17

SOPHOMORE YEAR

FALL	HOURS
EDSE 3500, Knowing and Learning in Mathematics and Science	3
LANG 1020, Foreign Language (elementary), or advanced technical writing**	3–4
MATH 2700, Linear Algebra and Vector Geometry	3
MATH 2730, Multivariable Calculus	3
Laboratory Science (see major requirements)** or PHYS 2220/PHYS 2240, Electricity and Magnetism and Laboratory (required for MATH/PHYS certification)	4
Total	16–17

SPRING	HOURS
EDSE 4000, Classroom Interactions	3
MATH 3000, Real Analysis I	3
MATH 3680, Applied Statistics	3
Understanding the Human Community*, or Elective	3
Visual and Performing Arts*	3
Total	15

JUNIOR YEAR

FALL	HOURS
BIOL 4700, Procedures and Materials for Science Instruction, or CHEM 4700, Procedures and Materials for Science Instruction, or PHYS 4700, Procedures and Materials for Science Instruction	3
HIST 2610, United States History to 1865*	3
MATH 3510, Introduction to Abstract Algebra I, or MATH 3610, Real Analysis II (see major requirements)	3
MATH Elective (3350 or higher)	3
Social and Behavioral Sciences*	3
Total	15

SPRING	HOURS
HIST 2620, United States History Since 1865*	3
MATH 4050, Advanced Study of the Secondary Mathematics Curriculum	3
MATH 4060, Foundations of Geometry	3
PHIL 2600, Ethics in Science	3
Understanding the Human Community*, or Elective	3
Total	15

SENIOR YEAR

FALL	HOURS
EDSE 4500, Project-Based Instruction	3
MATH Elective (3350 or higher)	3
MATH Elective (3350 or higher)	3
Elective or PHYS 3010/PHYS 3030, Modern Physics and Laboratory (required for MATH/PHYS certification)	3–4
Elective	1–2
Humanities*	3
Total	16–18

SPRING	HOURS
EDSE 4608/EDSE 4618, Student Teaching I and II in Mathematics and Science	6
EDSE 4128, Student Teaching Seminar	1
MATH analysis or algebra requirement (advanced, see major requirements)	3
Total	10

See the University Core Curriculum section of this catalog for approved list of course options.
*** See the math major requirements for approved list of course options.*
Students choosing the foreign language option (see major requirements) will also satisfy the Understanding the Human Community component of the University Core Curriculum.
Students choosing the technical writing option (see major requirements) will need to satisfy the Understanding the Human Community core component by selecting from approved course options in the "University Core Curriculum" in the Academics section of this catalog.

Actual degree audits may vary depending on availability of courses in a given semester.
Some courses may require prerequisites not listed.

Preparing for Graduate School

It is to be emphasized that the above are minimal requirements for an undergraduate degree in mathematics. For students who plan to go to graduate school in mathematics, the department strongly recommends the following courses: MATH 3410, MATH 3510, MATH 3610 and MATH 4500. Other advanced courses should be selected in consultation with the faculty and the undergraduate advisor in the Department of Mathematics.

Minors
Mathematics

Students planning to minor in mathematics should consult the undergraduate advisor of the Department of Mathematics. A minor consists of at least 18 hours of math courses (6 advanced) numbered MATH 1710 or higher. Elementary education majors may count 3 hours from MATH 1350 or MATH 1351 toward a mathematics minor. MATH 3310 and MATH 3410 may not both be used toward a minor in mathematics.

Mathematics and Science Secondary Teaching

Individuals interested in pursuing certification in math or science teaching at the secondary level may wish to pursue a minor through the Teach North Texas program. See "Teach North Texas" in the College of Arts and Sciences section of this catalog.

Statistics

A minor in statistics requires MATH 1710, MATH 1720, MATH 2730, MATH 3680, MATH 4610 and MATH 4650. In addition, one additional course concerning the application of statistical methods to another discipline must be taken. This course must be chosen in consultation with the undergraduate advisor in the Department of Mathematics. These courses include, but are not limited to, the following: CHEM 3451, DSCI 3870, ECON 4870 and ECON 4875, GEOG 3190, PHYS 4110 and PHYS 4310, PSCI 3300, and PSYC 3630.

Certificates
Actuarial Science

Students interested in this interdisciplinary certificate program should contact the undergraduate advisor of the mathematics department. To be admitted into this program, students must complete the following courses: MATH 2700, MATH 2730; either MATH 3680 or ECON 4630 or DSCI 3710;

ECON 1100, ECON 1110; CSCE 1020 or CSCE 1030 (CSCE 1040 is encouraged but not required); and FINA 3770.

This certificate requires 18 hours of courses: ECON 4870 and five elective classes selected from prefixes MATH, ECON, FINA and RMIN. Electives should be selected both for broad knowledge of the actuarial field and for preparation for the rigorous examination process prescribed by the Society of Actuaries and the Casualty Actuary Society. These five courses must be selected from the following:

a. For students not majoring in mathematics, MATH 3350, MATH 3410, MATH 3740, MATH 4610 and MATH 4650. Recommended courses are MATH 4610 and MATH 4650. For math majors, these classes may not be used for fulfilling certificate requirements.

b. FINA 4200, FINA 4210, FINA 4300, FINA 4310 and FINA 4400. Recommended courses are FINA 4200, FINA 4210 and FINA 4310.

c. RMIN 2500 or any 4000-level RMIN course. Recommended courses are RMIN 2500, RMIN 4200 and RMIN 4310. Students are also encouraged to seek internships that may be pursued in conjunction with RMIN 4800.

d. ECON 4030, ECON 4180 and ECON 4875.

e. Any other course must receive approval from the undergraduate advisor of the Department of Mathematics.

This program should prepare students for the preliminary actuarial exams, as follows:

a. Actuarial Exam 1/P: MATH 4610. Students are encouraged to take MATH 4610 and attempt Exam 1/P before the end of the junior year.

b. Actuarial Exam 2/FM: FINA 3770 and FINA 4210.

c. VEE (Validation by Educational Experience)-Economics: ECON 1100 and ECON 1110.

d. VEE-Applied Statistical Methods: ECON 4030 and ECON 4870.

e. VEE- Corporate Finance: FINA 3770 and FINA 4200.

More information about the actuarial exams, the VEE requirements, careers in actuarial science and internship opportunities may be found at *www.beanactuary.org*, *www.soa.org* and *www.casact.org*.

Statistics

A certificate in statistics consists of MATH 3680, MATH 4610, MATH 4650, and one additional course concerning the application of statistical methods to another discipline, chosen in consultation with the undergraduate advisor in the Department of Mathematics. Acceptable courses include, but are not limited to, the following: CHEM 3451, DSCI 3870, ECON 4870 and ECON 4875, GEOG 3190 and GEOG 4410, PHYS 4110 and PHYS 4310, PSCI 3300, and PSYC 3630.

Scholarships and Financial Assistance

The department administers five scholarship funds: the E. H. Hanson Scholarship, the Roger L. Perry Memorial Scholarship, the Mildred Masters McCarty Scholarship, the John Ed Allen Scholarship and the John W. Neuberger Scholarship. Jobs as tutors and graders also are available for mathematics majors. Contact the mathematics department office for information and application forms.

Graduate Degrees

The department offers degree programs leading to the Master of Arts, Master of Science and Doctor of Philosophy. For information, consult the *Graduate Catalog*.

Courses of Instruction

All Courses of Instruction are located in one section at the back of this catalog.

Course and Subject Guide

The "Course and Subject Guide," found in the Courses of Instruction section of this book, serves as a table of contents and provides quick access to subject areas and prefixes.