

# School of Natural Sciences and Mathematics

## Mathematics (BA, BS)

Mathematics is both a profession and an indispensable tool for many types of work. As a tool, mathematics is a universal language that has been crucial in formulating and expressing ideas not only in science and engineering, but also in many other areas such as business and the social sciences. As probably the oldest and most basic science, it provides the key to understanding the major technological achievements of our time.

Of equal importance, knowledge of mathematics may help provide a student with the type of uncompromising and clear-sighted thinking useful in considering the problems of many other disciplines. The Mathematics degree program encompasses mathematics, statistics, and applied mathematics. The Mathematical Sciences Department also administers a [Bachelor of Science in Actuarial Science](#).

Those interested in obtaining either a BA or a BS in Mathematics and Teacher Certification in the state of Texas should consult the [Teacher Development Center](#) or [UTeach Dallas office](#) for specific requirements as soon as possible after formal admission to the University. See the Teacher Education Certification Programs section of the catalog for additional information.

The Mathematics degree program also prepares students for graduate studies. An accelerated BS/MS Fast Track program is available which provides the opportunity for undergraduate students to satisfy some of the requirements of the master's degree while they are completing the bachelor's degree in Mathematics.

## The Program in Mathematics

Students seeking a degree in Mathematics may specialize in Mathematics, Statistics, or Applied Mathematics, and receive a BS degree. Each specialization allows some flexibility in electives so that students can better adapt their degree plans to their educational goals.

**Mathematics Specialization:** For students interested in a career in mathematics and for students interested in continuing on to graduate work in mathematics, applied mathematics, math education, and related areas.

**Statistics Specialization:** For students interested in probability and statistical models and their use in data analysis and decision-making and for students interested in continuing on to graduate work in statistics, biostatistics, actuarial science, and other statistics related areas.

**Applied Mathematics Specialization:** For students interested in mathematics for the purpose of

using it broadly in various areas of application and for students interested in continuing on to graduate work in applied mathematics and related areas.

## Bachelor of Arts in Mathematics

Degree Requirements (120 semester credit hours)<sup>1</sup>

All majors are strongly urged to meet with assigned departmental advisors every semester

### Faculty

FACG> nsm-mathematics-ba

**Professors:** Larry P. Ammann, Zalman I. Balanov, Vladimir Dragovic, Sam Efromovich, Yulia Gel, M. Ali Hooshyar, Wieslaw Krawcewicz, Susan E. Minkoff, L. Felipe Pereira, Dmitry Rachinskiy, Viswanath Ramakrishna, Robert Serfling, Janos Turi, John Zweck

**Professors Emeritus:** Patrick Odell, John W. Van Ness

**Clinical Professors:** Natalia Humphreys, Wenyi (Roy) Lu

**Associate Professors:** Swati Biswas, Yan Cao, Min Chen, Pankaj K. Choudhary, Mieczyslaw K. Dabkowski

**Assistant Professors:** Mohammad Akbar, Maxim Arnold, Bhargab Chattopadhyay, Qingwen Hu, Frank Konietschke, Yifei Lou, Oleg Makarenkov, Tomoki Oshawa, Qionxia (Joanne) Song, Anh Tran

**Senior Lecturers:** Mohammad Ahsan, Kelly Aman, Malgorzata Dabkowska, Rabin Dahal, Anatoly Eydelzon, Manjula Foley, Bentley T. Garrett, Farid Khafizov, Yuly Koshevnik, David L. Lewis, Changsong Li, Brady McCary, Derege Mussa, My Linh Nguyen, Jigarkumar Patel, Paul Stanford, Julie Sutton, Tristan Whalen

**UT Dallas Affiliated Faculty:** Hervé Abdi, Titu Andreescu, Alain Bensoussan, Stefano Leonardi, John J. Wiorkowski, Zhenyu Xuan, Hyuntae Yoo, Michael Qiwei Zhang

**Adjunct Faculty from the Research for Mathematics of the Mexican Council and Technology:** Jose Gomez-Larranaga, Adolfo (Sanchez) Valenzuela

I. Core Curriculum Requirements: 42 semester credit hours<sup>2</sup>

**Communication: 6 semester credit hours**

[COMM 1311](#) Survey of Oral and Technology-based Communication

[RHET 1302](#) Rhetoric

**Mathematics: 3 semester credit hours**

[MATH 2417](#) Calculus I <sup>3, 4, 5</sup>

**Life and Physical Sciences: 6 semester credit hours<sup>6</sup>**

[PHYS 2325](#) Mechanics

or [PHYS 2421](#) Honors Physics I - Mechanics and Heat

[PHYS 2326](#) Electromagnetism and Waves

or [PHYS 2422](#) Honors Physics II - Electromagnetism and Waves

**Language, Philosophy and Culture: 3 semester credit hours**

[HUMA 1301](#) Exploration of the Humanities

Or select any 3 semester credit hours from Language, Philosophy and Culture core courses (see advisor)

**Creative Arts: 3 semester credit hours**

[ARTS 1301](#) Exploration of the Arts

Or select any 3 semester credit hours from Creative Arts core courses (see advisor)

**American History: 6 semester credit hours**

Select any 6 semester credit hours from American history core courses (see advisor)

**Government/Political Science: 6 semester credit hours**

[GOVT 2305](#) American National Government

[GOVT 2306](#) State and Local Government

**Social and Behavioral Sciences: 3 semester credit hours**

Select any 3 semester credit hours from Social and Behavioral Sciences core courses (see advisor)

**Component Area Option: 6 semester credit hours**

[MATH 2417](#) Calculus I <sup>3, 4, 5</sup>

[MATH 2419](#) Calculus II <sup>3, 4, 5</sup>

[PHYS 2125](#) Physics Laboratory I<sub>6</sub>

II. Major Requirements: 49 semester credit hours

**Major Preparatory Courses: 19 semester credit hours beyond Core Curriculum**

[PHYS 2125](#) Physics Laboratory I<sub>6</sub>

[PHYS 2126](#) Physics Laboratory II

[PHYS 2325](#) Mechanics<sub>6</sub>

[PHYS 2326](#) Electromagnetism and Waves<sub>6</sub>

[MATH 2306](#) Analytical Geometry

[MATH 2370](#) Introduction to Programming with MATLAB

or [CS 1325](#) Introduction to Programming I<sub>7</sub>

or [CS 1337](#) Computer Science I<sub>7</sub>

[MATH 2417](#) Calculus I<sub>3, 4, 5</sub>

[MATH 2418](#) Linear Algebra<sub>7</sub>

[MATH 2419](#) Calculus II<sub>3, 4, 5</sub>

[MATH 2420](#) Differential Equations with Applications<sub>7</sub>

[MATH 2451](#) Multivariable Calculus with Applications<sub>7</sub>

**Major Core Courses: 21 semester credit hours**

[MATH 3310](#) Theoretical Concepts of Calculus

[MATH 3311](#) Abstract Algebra I

[MATH 3380](#) Differential Geometry

[MATH 3323](#) Elementary Number Theory

[MATH 3379](#) Complex Variables

[STAT 4351](#) Probability

### **Major Related Courses: 9 semester credit hours**

Nine semester credit hours of upper-division MATH, STAT or ACTS courses, at least six of which must be MATH courses at the 4000-level. These courses cannot include those for which the catalog entry states: "May not be used to satisfy mathematics requirements by students in Mathematics".

III. Elective Requirements: 29 semester credit hours

### **Electives: 29 semester credit hours**

All students are required to take [NATS 1101](#) Natural Sciences and Mathematics Freshman Seminar.

All students are required to take at least six semester credit hours of electives outside their major field of study. These must be either upper-division classes or lower-division classes that have prerequisites.

Both lower- and upper-division courses may count as electives, but the student must complete at least 51 semester credit hours of upper-division courses to qualify for graduation.

NOTE: Students transferring into Mathematics at the upper-division level are expected to have completed all of the 1000- and 2000- level mathematics core course requirements.

## **Bachelor of Science in Mathematics**

Degree Requirements (120 semester credit hours)<sup>1</sup>

All majors with specialization in either Mathematics, Statistics, or Applied Mathematics are strongly urged to meet with the assigned undergraduate advisor from the Mathematical Sciences Department every semester.

### **Faculty**

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**Professors:** Larry P. Ammann, Zalman I. Balanov, Vladimir Dragovic, Sam Efromovich, Yulia Gel, M. Ali Hooshyar, Wieslaw Krawcewicz, Susan E. Minkoff, L. Felipe Pereira, Dmitry Rachinskiy, Viswanath Ramakrishna, Robert Serfling, Janos Turi, John Zweck

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I. Core Curriculum Requirements: 42 semester credit hours<sup>2</sup>

**Communication: 6 semester credit hours**

[COMM 1311](#) Survey of Oral and Technology-based Communication

[RHET 1302](#) Rhetoric

**Mathematics: 3 semester credit hours**

[MATH 2417](#) Calculus I<sup>3, 4</sup>

**Life and Physical Sciences: 6 semester credit hours<sup>6</sup>**

*Mathematics/Applied Mathematics Specialization*

[PHYS 2325](#) Mechanics

or [PHYS 2421](#) Honors Physics I - Mechanics and Heat

[PHYS 2326](#) Electromagnetism and Waves

or [PHYS 2422](#) Honors Physics II - Electromagnetism and Waves

*Statistics Specialization*

[PHYS 2325](#) Mechanics

or [PHYS 2421](#) Honors Physics I - Mechanics and Heat

[PHYS 2326](#) Electromagnetism and Waves

or [PHYS 2422](#) Honors Physics II - Electromagnetism and Waves

Or

[CHEM 1311](#) General Chemistry I

[CHEM 1312](#) General Chemistry II

**Language, Philosophy and Culture: 3 semester credit hours**

[HUMA 1301](#) Exploration of the Humanities

Or select any 3 semester credit hours from Language, Philosophy and Culture core courses (see advisor)

**Creative Arts: 3 semester credit hours**

[ARTS 1301](#) Exploration of the Arts

Or select any 3 semester credit hours from Creative Arts core courses (see advisor)

**American History: 6 semester credit hours**

Select any 6 semester credit hours from American history core courses (see advisor)

**Government/Political Science: 6 semester credit hours**

[GOVT 2305](#) American National Government

[GOVT 2306](#) State and Local Government

**Social and Behavioral Sciences: 3 semester credit hours**

Select any 3 semester credit hours from Social and Behavioral Sciences core courses (see advisor)

**Component Area Option: 6 semester credit hours**

[MATH 2417](#) Calculus I <sup>3, 4</sup><sub>-</sub>

[MATH 2419](#) Calculus II <sup>3, 4</sup><sub>-</sub>

[PHYS 2125](#) Physics Laboratory I <sup>6</sup><sub>-</sub>

II. Major Requirements: 48-49 semester credit hours

**Major Preparatory Courses: 15-16 semester credit hours beyond Core Curriculum**

*For Mathematics Specialization*

[PHYS 2125](#) Physics Laboratory I<sub>6</sub>

[PHYS 2325](#) Mechanics<sub>6</sub>

[PHYS 2126](#) Physics Laboratory II

[PHYS 2326](#) Electromagnetism and Waves<sub>6</sub>

*For Statistics Specialization*

[PHYS 2125](#) Physics Laboratory I<sub>6</sub>

[PHYS 2325](#) Mechanics<sub>6</sub>

[PHYS 2126](#) Physics Laboratory II

[PHYS 2326](#) Electromagnetism and Waves<sub>6</sub>

Or

[CHEM 1111](#) General Chemistry Laboratory I<sub>3</sub>

[CHEM 1112](#) General Chemistry Laboratory II<sub>3</sub>

[CHEM 1311](#) General Chemistry I<sub>3</sub>

[CHEM 1312](#) General Chemistry II<sub>3</sub>

*For All*

[MATH 2370](#) Introduction to Programming with MATLAB

or [CS 1325](#) Introduction to Programming I<sub>7</sub>

or [CS 1337](#) Computer Science I<sub>7</sub>

[MATH 2417](#) Calculus I<sub>3, 4, 5</sub>

[MATH 2418](#) Linear Algebra<sub>7</sub>

[MATH 2419](#) Calculus II<sub>3, 4, 5</sub>

[MATH 2420](#) Differential Equations with Applications<sub>7</sub>



[MATH 2451](#) Multivariable Calculus with Applications<sup>7</sup>

**Major Core Courses: 21 semester credit hours**

[MATH 3310](#) Theoretical Concepts of Calculus

[MATH 3311](#) Abstract Algebra I

[MATH 3379](#) Complex Variables

[MATH 4301](#) Mathematical Analysis I

[MATH 4302](#) Mathematical Analysis II

[MATH 4334](#) Numerical Analysis

[STAT 4351](#) Probability

**Major Related Courses: 12 semester credit hours**

*Applied Mathematics Specialization*

[MATH 4341](#) Topology

[MATH 4355](#) Methods of Applied Mathematics

[MATH 4362](#) Partial Differential Equations

[STAT 4382](#) Stochastic Processes

*Mathematics Specialization*

[MATH 3312](#) Abstract Algebra II

[MATH 3380](#) Differential Geometry

[MATH 4341](#) Topology

3 semester credit hours upper-division guided elective<sup>8</sup>

*Statistics Specialization*

[STAT 3355](#) Data Analysis for Statisticians and Actuaries

[STAT 4352](#) Mathematical Statistics

[STAT 4382](#) Stochastic Processes

3 semester credit hours upper-division guided elective<sup>8</sup>

III. Elective Requirements: 29-30 semester credit hours

### **Electives: 29-30 semester credit hours**

All students are required to take at least six semester credit hours of electives outside their major field of study. These must be either upper-division classes or lower-division classes that have prerequisites.

Both lower- and upper-division courses may count as electives, but the student must complete at least 51 semester credit hours of upper-division courses to qualify for graduation.

NOTE: Students transferring into Mathematics at the upper-division level are expected to have completed all of the 1000- and 2000- level mathematics core course requirements.

## **UTeach Option**

The [UTeach option](#) may be added to the BS or BA degree in Mathematics. UTeach Dallas Option degree plans are streamlined to allow students to complete both a rigorous Bachelor of Science or Bachelor of Arts degree and all coursework for middle or high school teacher certification in four years. Teaching Option degrees require deep content knowledge combined with courses grounded in the latest research on math and science education. While most graduates go on to classroom teaching, UTeach alums are also prepared to enter graduate school and to work in discipline related industry.

## **Fast Track Baccalaureate/Master's Degrees**

For students interested in pursuing graduate studies in Mathematics or Statistics, the Mathematical Sciences Department offers an accelerated BS / MS Fast Track that involves taking graduate courses instead of several advanced undergraduate courses. The eligibility criteria for acceptance into the Fast Track includes a GPA (grade point average) of at least 3.200 in all mathematics classes and being within 30 semester credit hours of graduation. Fast Track students may, during their senior year, take 15 graduate semester credit hours that may be used to complete the baccalaureate degree. After Fast Track admission to the graduate program, these 15 graduate semester credit hours may also satisfy requirements for the master's degree. Fast Track programs are offered for specializations in mathematics, applied mathematics, and statistics. Admission to Fast Track is not automatic. The student must work with the assigned academic advisor and the undergraduate and graduate advisors of the Mathematical Sciences Department to submit an application for admission.

1. Incoming freshmen must enroll and complete requirements of UNIV 1010 and the corresponding school-related freshman seminar course. Students, including transfer students, who complete their core curriculum at UT Dallas must take UNIV 2020.

2. Curriculum Requirements can be fulfilled by other approved courses from institutions of higher education. The courses listed are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.
3. A required Major course that also fulfills Core Curriculum requirements. If semester credit hours are counted in the Core Curriculum, students must complete additional coursework to meet the minimum requirement for graduation. Course selection assistance is available from the undergraduate advisor.
4. Three semester credit hours of Calculus are counted to fulfill the Mathematics Core Requirement with the remaining five semester credit hours to be counted under Component Area Option Core.
5. MATH 2417 and MATH 2419 requirements can be fulfilled by completing MATH 2413, MATH 2414, and MATH 2415.
6. Six semester credit hours of Physics are counted under Science core, and one semester credit hour of Physics (PHYS 2125) is counted under Component Area Core.
7. Indicates a prerequisite class to be completed before enrolling in upper-division classes.
8. Approval of Mathematics department advisor required.

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