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.

Students interested in obtaining either a BA or a BS in Mathematics and Teacher Certification in the state of Texas should consult the UTeach Dallas office or the Teacher Development Center 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 choose from a variety of courses, which allow for flexibility and specialization so that students can better adapt their educational experience to further their academic goals. Students entering the field of mathematics at UT Dallas are prepared not only for careers in these areas, but also in numerous other professions that require expertise in mathematics.

Students who pursue a BS degree in mathematics typically use their degree in the fields of mathematics, statistics, science, or engineering. BS students choose a specialization in either mathematics, statistics or applied mathematics.

Mathematics Specialization: For students interested in a career in mathematics and for those who choose to continue their education at the graduate level in mathematics, applied mathematics, mathematics education or disciplines, such as statistics, that use mathematics.

Statistics Specialization: For students interested in probability and statistical models and their use in
data analysis and decision making; 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 application areas and for students interested in continuing on to graduate work in applied mathematics or related areas.

Students who pursue a BA degree in mathematics generally use mathematics as background for study in fields such as arts and technology, education, engineering or science.

Bachelor of Arts in Mathematics

Degree Requirements [120 semester credit hours]

View an Example of Degree Requirements by Semester

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

Faculty

Professors: Larry P. Ammann, Zalman I. Balanov, Pankaj K. Choudhary, Mieczyslaw K. Dabkowski, Vladimir Dragovic, Sam Efremovich, Yulia Gel, M. Ali Hooshyar, Wieslaw Krawcewicz, Susan E. Minkoff, L. Felipe Pereira, Dmitry Rachinskiy, Viswanath Ramakrishna, 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

Assistant Professors: Mohammad Akbar, Maxim Arnold, Carlos Arreche, Bhargab Chattopadhyay, Sy Han (Steven) Chiou, Qingwen Hu, Frank Konietzschke, Yifei Lou, Oleg Makarenkov, Tomoki Oshawa, Sunyoung Shin, Anh Tran, Nathan Williams

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, Faruck Morcos, John J. Wiorkowski, Zhenyu Xuan, Hyuntae Yoo, Michael Qiwei Zhang

I. Core Curriculum Requirements: 42 semester credit hours

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 \[^{3, 4, 5}\]

Life and Physical Sciences: 6 semester credit hours \[^{3, 6}\]

**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 \[^{3, 4, 5}\]

**MATH 2419** Calculus II \[^{3, 4, 5}\]

**PHYS 2125** Physics Laboratory \[^{3, 6}\]

II. Major Requirements: 49-51 semester credit hours
Major Preparatory Courses: 19-21 semester credit hours beyond Core Curriculum

**PHYS 2125** Physics Laboratory I$^{3,6}$
**PHYS 2126** Physics Laboratory II
**PHYS 2325** Mechanics$^{3,6}$
  or **PHYS 2421** Honors Physics I Mechanics and Heat$^{3,6}$
**PHYS 2326** Electromagnetism and Waves$^{3,6}$
  or **PHYS 2422** Honors Physics II Electromagnetism and Waves$^{3,6}$
**MATH 2306** Analytical Geometry
**MATH 2370** Introduction to Programming with MATLAB
  or **CS 1325** Introduction to Programming I$^7$
  or **CS 1337** Computer Science I$^7$
**MATH 2417** Calculus I$^{3,4,5}$
**MATH 2418** Linear Algebra$^7$
**MATH 2419** Calculus II$^{3,4,5}$
**MATH 2420** Differential Equations with Applications$^7$
**MATH 2451** Multivariable Calculus with Applications$^7$

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
**STAT 4352** Statistics

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: 27-29 semester credit hours
Electives: 27-29 semester credit hours

All students are required to take **NATS 1101** Natural Sciences and Mathematics Freshman Seminar.

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.

**Bachelor of Science in Mathematics**

*Degree Requirements* [120 semester credit hours]¹

*View an Example of Degree Requirements by Semester*

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**

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

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

I. Core Curriculum Requirements: 42 semester credit hours²

**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\textsuperscript{3, 4}

Life and Physical Sciences: 6 semester credit hours\textsuperscript{3, 8}

*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
  or CHEM 1315 Honors Freshman Chemistry I

CHEM 1312 General Chemistry II
  or CHEM 1316 Honors Freshman 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\(^3,4\)

**MATH 2419** Calculus II\(^3,4\)

**PHYS 2125** Physics Laboratory I\(^3,8\)

or **CHEM 1111** General Chemistry Laboratory I\(^3,8\)

II. Major Requirements: 49-51 semester credit hours

Major Preparatory Courses: 16-18 semester credit hours beyond Core Curriculum

*For Mathematics/Applied Mathematics Specialization*

**PHYS 2125** Physics Laboratory I\(^3,8\)

**PHYS 2325** Mechanics\(^3,8\)

or **PHYS 2421** Honors Physics I Mechanics and Heat\(^3,8\)

**PHYS 2126** Physics Laboratory II

**PHYS 2326** Electromagnetism and Waves\(^3,8\)

or **PHYS 2422** Honors Physics II Electromagnetism and Waves\(^3,8\)

*For Statistics Specialization*

**PHYS 2125** Physics Laboratory I\(^3,8\)

**PHYS 2325** Mechanics\(^3,8\)

or **PHYS 2421** Honors Physics I Mechanics and Heat\(^3,8\)

**PHYS 2126** Physics Laboratory II

**PHYS 2326** Electromagnetism and Waves\(^3,8\)

or **PHYS 2422** Honors Physics II Electromagnetism and Waves\(^3,8\)

Or
CHEM 1111 General Chemistry Laboratory I \(^3\), \(^8\)  
 or CHEM 1115 Honors Freshman Chemistry Laboratory I  
CHEM 1112 General Chemistry Laboratory II  
 or CHEM 1116 Honors Freshman Chemistry Laboratory II  
CHEM 1311 General Chemistry \(^3\), \(^8\)  
 or CHEM 1315 Honors Freshman Chemistry \(^3\), \(^8\)  
CHEM 1312 General Chemistry II \(^3\), \(^8\)  
 or CHEM 1316 Honors Freshman Chemistry II \(^3\), \(^8\)  

For All  
 MATH 2370 Introduction to Programming with MATLAB  
 or CS 1325 Introduction to Programming I \(^7\)  
 or CS 1337 Computer Science I \(^7\)  
 MATH 2417 Calculus \(^3\), \(^4\), \(^5\)  
 MATH 2418 Linear Algebra \(^7\)  
 MATH 2419 Calculus II \(^3\), \(^4\), \(^5\)  
 MATH 2420 Differential Equations with Applications \(^7\)  
 MATH 2451 Multivariable Calculus with Applications \(^7\)  

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

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

III. Elective Requirements: 27-29 semester credit hours

Electives: 27-29 semester credit hours
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.

UTeach Option
The UTeach option may be added to either the BA or BS degree. 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 one semester credit hour 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. Six semester credit hours of Physics or Chemistry are counted under Science core, and one semester credit hour of Physics or Chemistry (PHYS 2125 or CHEM 1111) is counted under Component Area Core.

9. Approval of Mathematics department advisor required.

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