

Mathematics and Statistics with Interdisciplinary Applications (PhD)

Overview

The proposed doctoral program in Mathematics and Statistics with Interdisciplinary Applications (MSIA) is designed to provide a strong mathematics and statistics background to support intense quantitative work in diverse disciplines. The curriculum will prepare scholars to work on problems at the intersection of mathematics, science, engineering, medicine, finance, computer science, and other quantitative disciplines. The program aims to be the most inclusive and broadly interdisciplinary in Texas.

Admission requirements

Undergraduate students with a degree in a relevant application area do not require an undergraduate degree in mathematics or statistics.

Program Requirements for Students with a Bachelor's Degree

Students admitted with a bachelor's degree will complete a minimum of 72 hours to earn the PhD in MSIA as follows:

1. Required Core Courses – 12 hours
2. Prescribed Electives – 15 hours
3. Interdisciplinary Courses – 9 hours
4. Dissertation/Seminar/Interdisciplinary Courses – 36 hours

Program Requirements for Students with Master's Degree

Students admitted with a master's degree will complete a minimum of 57 hours to earn the PhD in MSIA as follows:

1. Required Core Courses – 6 hours
2. Prescribed Electives – 6 hours
3. Interdisciplinary Courses – 9 hours
4. Dissertation/Seminar/Interdisciplinary Courses – 36 hours

In addition to general requirements of admissions to the UTRGV Graduate College, the doctoral program in Mathematics and Statistics with Interdisciplinary Applications will also require:

1. B.S. or B.A. in a STEM field or related field, with at least 3 advanced undergraduate courses in Mathematics from the following areas: Linear Algebra, Differential Equations Modern Algebra I, Real Analysis I, Probability and Statistics Complex Variables or earned a Master's degree in Mathematics or a related field from a regionally accredited institution in the United States or a recognized international equivalent in a similar or related field with at least 3 undergraduate classes as given above;

2. TOEFL score of 79 or better for international students if the medium of instruction in their bachelors or master's program was not English;
3. GRE General Test is required and the GRE Subject test in Mathematics is recommended;
4. Three letters of recommendation.

The program will accept part-time students as well as transfer students from other graduate programs. Transfer of graduate credit based on policies set out by the UTRGV Graduate College.

Program Requirements

Required Core Courses - 6 or 12 Hours

[MATH 6330](#) Linear Algebra

[MATH 6331](#) Algebra I

[MATH 6333](#) Statistical Learning

[MATH 6352](#) Analysis I

[MATH 6360](#) Ordinary Differential Equations

[MATH 6364](#) Statistical Methods

[MATH 6365](#) Probability and Statistics

[MATH 6375](#) Numerical Analysis

Prescribed Electives - 6 or 15 Hours

[MATH 8323](#) Group Theory

[MATH 8329](#) Number Theory

[MATH 8332](#) Algebra II

[MATH 8334](#) Machine Learning

[MATH 8335](#) Deep Learning

[MATH 8336](#) Introduction to Data Science

[MATH 8337](#) Information Theory

[MATH 8338](#) Mathematical Foundations of Statistical and Quantum Mechanics

[MATH 8339](#) Complex Theory

[MATH 8353](#) Analysis II

[MATH 8361](#) Partial Differential Equations

[MATH 8362](#) Fourier Analysis

[MATH 8363](#) Integrable Systems

[MATH 8366](#) Micro-Local Analysis

[MATH 8367](#) Functional Analysis

[MATH 8369](#) Mathematical Methods

[MATH 8371](#) Differential Geometry

[MATH 8376](#) Numerical Methods for Partial Differential Equations

[MATH 8379](#) Stochastic Processes

[MATH 8381](#) Mathematical Statistics

[MATH 8387](#) Mathematical Modeling

[MATH 8388](#) Discrete Mathematics

Interdisciplinary Courses - 9 Hours

Computational Mathematics and Computer/Electrical Engineering

[CSCI 6323](#) Design and Analysis of Algorithms

[CSCI 6356](#) Parallel Computing

[ELEE 6315](#) Applied Electromagnetics

[ELEE 6345](#) Digital Signal Processing I

[ELEE 6347](#) Image Processing

[MATH 8378](#) Inverse Problem and Image Reconstruction

[MATH 8385](#) Cryptology & Codes

[MATH 8388](#) Discrete Mathematics

[MATH 8343](#) Linear Models

[MATH 8344](#) Function Space Methods in System Theory

Mathematical Biology and Nonlinear Mechanics

[BIOL 6320](#) Vector Biology

[BIOL 5421](#) Biotechnology

[BIOL 6400](#) Neuroscience

[MECE 6372](#) Viscous Flow I

[MECE 6375](#) Engineering Acoustics

[MECE 6379](#) Gas Dynamics

[MATH 8346](#) Hydrodynamic Stability

[MATH 8347](#) Turbulence

[MATH 8377](#) Mathematical Fluid Mechanics

Data Analytics and Medical Applications

[CSCI 6355](#) Bioinformatics

[CSCI 6366](#) Data Mining and Warehousing

[STAT 5301](#) Statistical Data Analysis

[MATH 8334](#) Machine Learning

[MATH 8335](#) Deep Learning

[MATH 8336](#) Introduction to Data Science

[MATH 8337](#) Information Theory

[MATH 8348](#) Survival Analysis

[MATH 8349](#) Loss Models

[MATH 8350](#) Actuarial Risk Theory

[MATH 8382](#) Statistical Computing

[MATH 8384](#) Biostatistics

Mathematical Physics

[PHYS 5340](#) Quantum Mechanics I

[PHYS 5392](#) Gravitational Wave Astronomy

[PHYS 5393](#) Introduction to General Relativity and Gravitation

[PHYS 6352](#) Computational Physics

[MATH 8338](#) Mathematical Foundations of Statistical and Quantum Mechanics

[MATH 8371](#) Differential Geometry

[MATH 8363](#) Integrable Systems

[MATH 8351](#) Nonlinear hyperbolic PDEs

[MATH 8374](#) Applications of Differential Geometry

Dissertation/Seminar/Interdisciplinary Course - 36 Hours

[MATH 9901](#) Dissertation I

[MATH 9901](#) Dissertation I

[MATH 9902](#) Dissertation II

[MATH 9101](#) Graduate Research Seminar

[MATH 9101](#) Graduate Research Seminar

[MATH 9101](#) Graduate Research Seminar

[MATH 9101](#) Graduate Research Seminar

[MATH 9101](#) Graduate Research Seminar

[MATH 9101](#) Graduate Research Seminar

[MATH 8398](#) Interdisciplinary Course

Total Credit Hours: 57