Mathematics - Graduate Programs

Objective

The objectives of the UT Arlington Mathematics Department's graduate program are:

- Develop the students' ability to do independent research and prepare them for more advanced studies in mathematics.
- Provide advanced training and preparation for professional careers as mathematicians, mathematics teachers, and those employed in engineering, scientific and business fields.

Graduate work will be offered in algebra, complex and real variables, data science, differential equations, functional analysis, geometry, mathematics education, numerical analysis, probability, statistics and topology.

Admissions Requirements

MASTER OF SCIENCE PROGRAM

For unconditional admission, a student must meet the following requirements:

a. A B.A. or B.S. degree in mathematics or closely related field.
b. An overall GPA in the final 60 hours of coursework of a 3.0 or better, as calculated by the Graduate School, on a 4.0 scale.
c. Minimum of 350 on the verbal and 650 on the quantitative portions of the Graduate Record Examination (GRE) if taken prior to August 2011. Minimum of 143 on the verbal and 151 on the quantitative portions of the GRE if taken after August 2011.
d. For applicants whose native language is not English, a minimum score of 550 on the Test of English as a Foreign Language (or a minimum score of 213 on a computer-based test, or a minimum score of 79 on an internet-based test) or a minimum score of 40 on the Test of Spoken English.
e. Three favorable letters of recommendation from people familiar with the applicant's academic work.

Applicants who do not satisfy requirements 2 or 3 above may be considered for unconditional admission if further review of their undergraduate transcript, recommendation letters, correspondence or direct interactions with mathematics faculty, and statement of professional or research interests indicates that they are qualified to enter the Master's Program without deficiency.

If an applicant does not meet a majority of standards for unconditional admission outlined above, they may be considered for probationary admission after careful examination of their application materials. Probationary admission requires that the applicant receive a B or better in the first 12 hours of graduate coursework at UT Arlington.

Students who are unconditionally admitted or admitted on probation will be eligible for available scholarship and/or fellowship support. Award of scholarships or fellowships will be based on consideration of the same criteria utilized in admission decisions. To be eligible, candidates must be new students coming to UT Arlington in the fall semester, must have a GPA of 3.0 in the last 60 undergraduate credit hours plus any graduate credit hours as calculated by the Graduate School, and must be enrolled in a minimum of 6 hours of coursework in both long semesters to retain the fellowship.

Applicants may be denied admission if they have less than satisfactory performance on a majority of the admission criteria described above.

A deferred decision may be granted when a file is incomplete or when a denied decision is not appropriate. An applicant unable to supply all required documentation prior to the admission deadline, but who otherwise appears to meet admission requirements, may be granted provisional admission.

MASTER OF ARTS PROGRAM

For unconditional admission a student must meet items 1-3 or 3-5.

a. A B.S. or B.A. degree with at least 24 hours of mathematics coursework with a GPA of at least 3.0, as calculated by the Graduate School on a 4.0 scale.
b. Minimum of 400 on the verbal and 600 on the quantitative portions of the Graduate Record Examination (GRE) if taken prior to August 2011. Minimum of 146 on the verbal and 148 on the quantitative portions of the GRE if taken after August 2011.
c. Three favorable letters of recommendation from people familiar with the applicant's academic work and/or professional work.
d. A B.S. or B.A. degree with a GPA of at least 3.0, as calculated by the Graduate School on a 4.0 scale.
e. Certified to teach mathematics at the Secondary Level (Secondary Mathematics Certification).

Applicants who do not satisfy requirements 1 or 2 above may be considered for unconditional admission if further review of their undergraduate transcript, recommendation letters, correspondence or direct interactions with mathematics faculty, and statement of professional or research interests indicates that they are qualified to enter the Master's Program without deficiency.

If an applicant does not meet a majority of standards for unconditional admission outlined above, they may be considered for probationary admission after careful examination of their application materials. Probationary admission requires that the applicant receive a B or better in the first 12 hours of graduate coursework at UT Arlington.

Applicants may be denied admission if they have less than satisfactory performance on a majority of the admission criteria described above.

A deferred decision may be granted when a file is incomplete or when a denied decision is not appropriate. An applicant unable to supply all required documentation prior to the admission deadline, but who otherwise appears to meet admission requirements, may be granted provisional admission.

Master of Science Degree Requirements

The Department of Mathematics offers master's degree programs in mathematics with additional emphasis in applied mathematics, computational mathematics, mathematics education, pure mathematics, and statistics. All students are to use the thesis plan, thesis-substitute plan, or non-thesis plan.

All students in Master of Science program must complete one of the following:

General Mathematics core requirements[1]:

MATH 5307	MATHEMATICAL ANALYSIS I	3
MATH 5333	LINEAR ALGEBRA AND MATRICES	3
Select one of the following tracks:		
General Mathematics:		15
MATH 5317	REAL ANALYSIS	3
MATH 5322	COMPLEX VARIABLES I	3
MATH 5327	FUNCTIONAL ANALYSIS I	3
MATH 5331	ABSTRACT ALGEBRA I	3
MATH 5338	NUMERICAL ANALYSIS I	3
Applied Mathematics:		15
MATH 5300	INTRODUCTION TO SCIENTIFIC COMPUTING	3
Select four of the following:		12
MATH 5350	APPLIED MATHEMATICS I	
MATH 5351	APPLIED MATHEMATICS II	
MATH 5320	ORDINARY DIFFERENTIAL EQUATIONS	
MATH 5321	APPLIED PARTIAL DIFFERENTIAL EQUATIONS	
An area-related graduate course chosen in consultation with the student's advisor.		
Computational Mathematics:		15
MATH 5300	INTRODUCTION TO SCIENTIFIC COMPUTING	3
MATH 5338	NUMERICAL ANALYSIS I	3
MATH 5339	NUMERICAL ANALYSIS II	3
MATH 5371	APPLIED NUMERICAL LINEAR ALGEBRA	3
or MATH 5373	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	
An area-related graduate course chosen in consultation with the student's advisor.		3
Data Science:		15
MATH 5300	INTRODUCTION TO SCIENTIFIC COMPUTING	3
MATH 5305	STATISTICAL METHODS	3
MATH 5371	APPLIED NUMERICAL LINEAR ALGEBRA	3
or MATH 6310	FOUNDATION OF DATA SCIENCES	
Select 2 of the following:		6
MATH 5312	MATHEMATICAL STATISTICS I	3
MATH 5338	NUMERICAL ANALYSIS I (OR AN AREA-RELATED COURSE CHOSEN IN CONSULATION WITH THE STUDENT'S ADVISOR)	3
MATH 6311	OPTIMIZATION ON BIG DATA	3
MATH 6312	DATA MINING	3
Mathematics Education:		15
MATH 5300	INTRODUCTION TO SCIENTIFIC COMPUTING	3
MATH 5305	STATISTICAL METHODS	3
Select three of the following:		9

MATH 5341	MODERN GEOMETRY	
MATH 5342	CONCEPTS AND TECHNIQUES IN ALGEBRA	
MATH 5344	MATHEMATICS-SPECIFIC TECHNOLOGIES	
MATH 5345	HISTORICAL APPROACH TO REAL ANALYSIS	
MATH 5346	CONCEPTS AND TECHNIQUES IN PROBLEM SOLVING	
Pure Mathematics:		15
MATH 5322	COMPLEX VARIABLES I	3
MATH 5331	ABSTRACT ALGEBRA I	3
Select 3 from the following:		9
MATH 5304	GENERAL TOPOLOGY	
MATH 5326	ALGEBRAIC TOPOLOGY	
MATH 5329	HOMOLOGICAL ALGEBRA	
MATH 5330	ALGEBRAIC GEOMETRY	
MATH 5332	ABSTRACT ALGEBRA II	
MATH 5334	DIFFERENTIAL GEOMETRY	
Or select 3 from the following:		9
MATH 5300	INTRODUCTION TO SCIENTIFIC COMPUTING	
MATH 5304	GENERAL TOPOLOGY	
MATH 5317	REAL ANALYSIS	
MATH 5321	APPLIED PARTIAL DIFFERENTIAL EQUATIONS	
MATH 5327	FUNCTIONAL ANALYSIS I	
MATH 5334	DIFFERENTIAL GEOMETRY	

General Statistics core requirements[1]:

MATH 5300	INTRODUCTION TO SCIENTIFIC COMPUTING	3
MATH 5307	MATHEMATICAL ANALYSIS I	3
MATH 5333	LINEAR ALGEBRA AND MATRICES	3
MATH 5305	STATISTICAL METHODS	3
MATH 5312	MATHEMATICAL STATISTICS I	3
MATH 5313	MATHEMATICAL STATISTICS II	3
Select one of the following:		3
MATH 5356	APPLIED MULTIVARIATE STATISTICAL ANALYSIS	
MATH 5357	SAMPLE SURVEYS	
MATH 5358	REGRESSION ANALYSIS	
Total Hours		**21**

In addition:

a. Those students enrolled in the non-thesis plan must take at least 15 other hours of electives approved by the graduate advisor[2].

b. Those students enrolled in the thesis substitute plan must take MATH 5395 SPECIAL PROJECT, and must take at least nine other hours of electives[2].

c. Those students enrolled in the thesis plan must take at least six hours of MATH 5398 / MATH 5698, and must take at least three other hours of electives[2].

[1]Core requirements can also be fulfilled by completing core requirements in the BS-Ph.D. track in the Doctoral program.
[2]Electives may not be chosen from MATH 5336, MATH 5337, MATH 5340, MATH 5341, MATH 5342, MATH 5343, MATH 5344, MATH 5345, MATH 5346, MATH 5347, MATH 5348, MATH 5352, MATH 5370, MATH 5375, MATH 5376, MATH 5377, MATH 5378, MATH 5379. However, students in the Mathematics Education thesis or thesis-substitute track may choose three hours from Math 5336, 5337, 5340-5348,5352, 5370, 5375-5379. Students in the Mathematics Education non-thesis track may choose six hours from Math 5336, 5337, 5340-5348,5352, 5370, 5375-5379. Students in the Computational Mathematics track may choose three approved hours of electives in science and/or engineering. Elective courses for pure-mathematics track must be chosen from MATH 5300, MATH 5304, MATH 5317, MATH 5321, MATH 5326,MATH 5327, MATH 5329, MATH 5330, MATH 5332, MATH 5334, MATH 5380, or MATH 5392 courses offered in the pure-mathematics track.

Students in thesis degree plan or thesis-substitute plan must pass a final Master's exam.

Master of Arts Degree Requirements

The Master of Arts in Mathematics program in the Department of Mathematics is designed to extend undergraduate mathematics experiences in the area of specialized mathematics content for secondary school and early college mathematics teaching. The program focuses on enhancing mathematics teaching through innovative preparation in topics grounded in secondary school and early college mathematics from an advanced standpoint. The program embraces a philosophy of teaching and learning mathematics that is consistent with the landmark *Standards* documents produced by the National Council of Teachers of Mathematics.

The requirements for the Master of Arts degree thesis-substitute option are 30 hours of graduate courses from the Department of Mathematics and a 3-hour project. Students in the thesis-substitute plan must pass a final Master's exam. The requirements for a Master of Arts degree non-thesis option are 36 hours of graduate courses from the Department of Mathematics.

All students in the Master of Arts program must complete one of the following:

Required Courses		18
MATH 5341	MODERN GEOMETRY	3
MATH 5342	CONCEPTS AND TECHNIQUES IN ALGEBRA	3
MATH 5343	CONCEPTS AND TECHNIQUES IN PROBABILITY AND STATISTICS	3
MATH 5344	MATHEMATICS-SPECIFIC TECHNOLOGIES	3
MATH 5345	HISTORICAL APPROACH TO REAL ANALYSIS	3
MATH 5346	CONCEPTS AND TECHNIQUES IN PROBLEM SOLVING	3
Thesis-Substitute Option:		**15**
MATH 5395	SPECIAL PROJECT (Individual, Director-Approved Research)	
Students must successfully complete 12 additional hours of electives. Electives may not be chosen from MATH 5375-MATH 5379.		
Non-Thesis Option:		**18**
Students must successfully complete 18 additional hours of electives. Electives may not be chosen from MATH 5375-MATH 5379.		

Admission Requirements

For unconditional admission a student must meet the following requirements:

a. A master's degree or at least 30 hours of graduate coursework in mathematics or closely related fields.

b. A minimum GPA of 3.0, as calculated by the Graduate School, on a 4.0 scale in graduate coursework.

c. Minimum of 350 on the verbal and 700 on the quantitative portions of the Graduate Record Examination (GRE) if taken prior to August 2011. Minimum of 143 on the verbal and 155 on the quantitative portions of the GRE if taken after August 2011.

d. For applicants whose native language is not English, a minimum score of 550 on the Test of English as a Foreign Language (or a minimum score of 213 on a computer-based test, or a minimum score of 79 on an internet-based test) or a minimum score of 40 on the Test of Spoken English.

e. Three favorable letters of recommendation from people familiar with the applicant's academic work and/or professional work.

Applicants who do not satisfy requirements 2 or 3 above may be considered for unconditional admission if further review of their undergraduate transcript, recommendation letters, correspondence or direct interactions with mathematics faculty, and statement of professional or research interests indicates that they are qualified to enter the Doctoral Program without deficiency.

If an applicant does not meet a majority of standards for unconditional admission outlined above, they may be considered for probationary admission after careful examination of their application materials. Probationary admission requires that the applicant receive a B or better in the first 12 hours of graduate coursework at UT Arlington.

Applicants may be denied admission if they have less than satisfactory performance on a majority of the admission criteria described above.

A deferred decision may be granted when a file is incomplete or when a denied decision is not appropriate. An applicant unable to supply all required documentation prior to the admission deadline, but who otherwise appears to meet admission requirements, may be granted provisional admission.

DOCTORAL PROGRAM (B.S.-PH.D. TRACK)

For unconditional admission a student must meet the following requirements:

a. A bachelor's degree in mathematics or in a closely related field.

b. A minimum GPA of 3.00 on the 4.00 scale in undergraduate course work, as calculated by the UT Arlington Graduate School.

c. A minimum of 350 on the verbal part and 700 on the quantitative part of the Graduate Record Examination (GRE) if taken prior to August 2011. Minimum of 143 on the verbal and 155 on the quantitative portions of the GRE if taken after August 2011.

d. For an applicant whose native language is not English, a minimum score of 550 on the Test of English as a Foreign Language (or a minimum score of 213 on a computer-based test, or a minimum score of 79 on an internet-based test) or a minimum score of 40 on the Test of Spoken English.

e. At least three letters of recommendation from people familiar with the applicant's academic work and/or professional work.

Applicants who do not satisfy requirement 2 or/and 3 above may be considered for an unconditional admission if a further review of their undergraduate transcript(s), recommendation letters, correspondence or direct interactions with mathematics faculty, and statement of professional or research interests indicates that they are qualified to enter the B.S.-Ph.D. track program without deficiency.

If an applicant does not meet a majority of standards for an unconditional admission outlined above, he/she may be considered for a probationary admission after a careful examination of his/her application materials. A probationary admission requires that the applicant receive grades of B or better in the first 12 hours of graduate course work at UT Arlington.

An applicant may be denied admission if he/she has less than satisfactory performance on a majority of the admission criteria described above.

A deferred decision may be granted when the applicant's file is incomplete or when a denial on his/her admission is not appropriate. An applicant who is unable to supply all required documentation prior to the admission deadline but who otherwise appears to have met admission requirements may be granted provisional admission.

Students who are unconditionally admitted or admitted on probation will be eligible for available scholarship and/or fellowship support. Award of scholarships or fellowships will be based on consideration of the same criteria utilized in admission decisions. To be eligible, candidates must be new students coming to UT Arlington in the fall semester, must have a GPA of 3.0 in the last 60 undergraduate credit hours plus any graduate credit hours as calculated by the Graduate School, and must be enrolled in a minimum of 6 hours of coursework in both long semesters to retain the fellowship.

Ph.D. Degree Requirements

A dynamic program leading to the Doctor of Philosophy degree in the mathematics will aim at both real and demonstrated competency on the part of the student over material from various branches of mathematics. The Doctor of Philosophy degree in Mathematics provides a program of study that may be tailored to meet the needs of those interested in applied or academic careers. This program allows students to pursue topics ranging from traditional mathematics studies to applied mathematical problems in engineering and sciences. The nature of the dissertation will range from research in mathematics to the discovery and testing of mathematical models for analyzing given problems in engineering and sciences and in locating and developing mathematical and computational techniques for deducing the properties of these models as to solve these problems effectively and efficiently. Such dissertations will be concerned with research problems from pure mathematics, applied mathematics, mathematics education and statistics.

The Department of Mathematics offers doctoral degree programs in Mathematics (algebra, applied mathematics, data science, geometry, mathematics education, numerical analysis and statistics).

All doctoral students must complete one of the following:

1. General MATHEMATICS core requirements:

MATH 5317	REAL ANALYSIS	3
MATH 5322	COMPLEX VARIABLES I	3
MATH 5327	FUNCTIONAL ANALYSIS I	3
MATH 5331	ABSTRACT ALGEBRA I	3
MATH 5338	NUMERICAL ANALYSIS I	3
In addition to the mathematics core requirements, the student is required to take four area-related courses, in consultation with their advisor		12
Total Hours		**27**

2. STATISTICS and Data science core requirements:

MATH 5312	MATHEMATICAL STATISTICS I	3
MATH 5319	PROBABILITY THEORY	3
MATH 6310	FOUNDATION OF DATA SCIENCES	3
MATH 6390	BAYESIAN DATA ANALYSIS	3
MATH 5358	REGRESSION ANALYSIS	3
or MATH 5359	SURVIVAL ANALYSIS	
In addition to the statistics and data science core requirements, students are also required to take four area-related courses, chosen in consultation with their advisor. Among the four, students are strongly recommended to take the following two data science courses: MATH 6311. OPTIMIZATION ON BIG DATA; MATH 6312. DATA MINING.		12
Total Hours		**27**

3. General MATHEMATICS-DATA SCIENCE (jointly with Computer Science and Engineering department) core requirements:

MATH 5317	REAL ANALYSIS	3
MATH 5322	COMPLEX VARIABLES I	3
MATH 5327	FUNCTIONAL ANALYSIS I	3
MATH 5338	NUMERICAL ANALYSIS I	3
CSE 5301	DATA ANALYSIS & MODELING TECHNIQUES	3
CSE 5311	DESIGN AND ANALYSIS OF ALGORITHMS	3
CSE 5334	DATA MINING	3
In addition to the MATH/CSE core requirements, the student is required to take two area-related courses in MATH or CSE, chosen in consultation with their advisor.		6
Total Hours		**27**

Students in every degree plan must pass the preliminary examinations, a diagnostic evaluation, and a comprehensive examination. A minimum of 9 dissertation hours must be taken to satisfy the graduation requirement for doctoral degree in the Mathematics Department. Doctoral students must enroll in the appropriate 6699, 6999 or 7399 Dissertation Completion course the semester in which the dissertation is defended. Students typically enroll in these courses defend and apply for graduation in the same term. The Dissertation Completion course (7399) may only be taken once and cannot be repeated.

Ph.D. Degree Requirements for the B.S.-Ph.D. track

The student must complete either the mathematics or statistics core requirements.

1. General MATHEMATICS core requirements:

MATH 5307	MATHEMATICAL ANALYSIS I	3
MATH 5317	REAL ANALYSIS	3
MATH 5322	COMPLEX VARIABLES I	3
MATH 5327	FUNCTIONAL ANALYSIS I	3
MATH 5331	ABSTRACT ALGEBRA I	3
MATH 5333	LINEAR ALGEBRA AND MATRICES	3
MATH 5338	NUMERICAL ANALYSIS I	3
In addition to the mathematics core requirements, the student is required to take four area-related courses, chosen in consultation with their advisor.		12
Total Hours		**33**

2. STATISTICS AND DATA SCIENCE core requirements:

MATH 5307	MATHEMATICAL ANALYSIS I	3
MATH 5312	MATHEMATICAL STATISTICS I	3
MATH 5319	PROBABILITY THEORY	3
MATH 5333	LINEAR ALGEBRA AND MATRICES	3
MATH 6310	FOUNDATION OF DATA SCIENCES	3
MATH 6390	BAYESIAN DATA ANALYSIS	3
MATH 5358	REGRESSION ANALYSIS	3
or MATH 5359	SURVIVAL ANALYSIS	
In addition to the statistics and data science core requirements, students are also required to take four area-related courses, chosen in consultation with their advisor. Among the four, students are strongly recommended to take the following two data science courses: MATH 6311. OPTIMIZATION ON BIG DATA; MATH 6312. DATA MINING.		12
Total Hours		**33**

3. General MATHEMATICS-DATA SCIENCE (jointly with Computer Science and Engineering department) core requirements:

MATH 5307	MATHEMATICAL ANALYSIS I	3
MATH 5317	REAL ANALYSIS	3
MATH 5322	COMPLEX VARIABLES I	3
MATH 5327	FUNCTIONAL ANALYSIS I	3
MATH 5333	LINEAR ALGEBRA AND MATRICES	3
MATH 5338	NUMERICAL ANALYSIS I	3

CSE 5301	DATA ANALYSIS & MODELING TECHNIQUES	3
CSE 5311	DESIGN AND ANALYSIS OF ALGORITHMS	3
CSE 5334	DATA MINING	3
In addition to the MATH/CSE core requirements, the student is required to take two area-related courses in MATH or CSE, chosen in consultation with their advisor.		6
Total Hours		**33**

The requirements for the preliminary examinations, diagnostic evaluation, and comprehensive examination are the same as the other tracks in the Ph.D. program. A minimum of 9 dissertation hours must be taken to satisfy the graduation requirement for doctoral degree in the Mathematics Department. Doctoral students must enroll in the appropriate 6699, 6999 or 7399 Dissertation Completion course the semester in which the dissertation is defended. Students typically enroll in these courses defend and apply for graduation in the same term. The Dissertation Completion course (7399) may only be taken once and cannot be repeated.

For additional information on the mathematics program, see the program entry in the Interdepartmental and Intercampus Programs section of this catalog.

Certificate of Applied Statistics Program

The admission standard is the same as that of Master of Science Program (http://catalog.uta.edu/science/math/graduate/#masterstext).

Certificate of Applied Statistics Requirements

The Certificate in Applied Statistics offers individuals with an undergraduate degree an opportunity to receive graduate instruction in applied statistics as a means of maintaining and enhancing their professional development. The certificate program will provide coursework in statistics to an individual whose undergraduate major was outside the area of statistics. Since the requirements for the certificate are substantially less than those for the Master's Degree in Mathematics with a concentration in Statistics, the certificate can be earned in a much shorter time span. When applicable, the courses taken in the certificate program can also be used to satisfy a Master of Science in Mathematics degree requirement at UTA and other institutions. Consult with the graduate advisor for advice on graduate course transfer.

The Certificate in Applied Statistics requires that the students take and successfully complete the following courses.

Required Courses		
STATS 5312	MATHEMATICAL STATISTICS I	3
STATS 5313	MATHEMATICAL STATISTICS II	3
Electives		
Select three of the following:		9
STATS 5305	STATISTICAL METHODS	
STATS 5314	EXPERIMENTAL DESIGN	
STATS 5353	APPLIED LINEAR MODELS	
STATS 5356	APPLIED MULTIVARIATE STATISTICAL ANALYSIS	
STATS 5357	SAMPLE SURVEYS	
STATS 5358	REGRESSION ANALYSIS	
MATH 5392	SELECTED TOPICS IN MATHEMATICS (Statistical Quality Control)	
MATH 5392	SELECTED TOPICS IN MATHEMATICS (Statistical Methods in Clinical Research)	
Total Hours		**15**

Upon completion of the 15 hours of graduate courses from lists 1 and 2 with a minimum GPA of 3.0, the student is awarded the Certificate in Applied Statistics. The expected time to completion is 1 to 2 years. The time limit for completion of the certificate program is 6 years.