Department of Mathematics

Contact Information

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The department offers several programs designed to give the student an insight into the structure and applications of mathematics and statistics necessary for industrial or governmental employment, teaching, or pursuit of an advanced degree in mathematics and statistics. The department also offers minors in Applied Statistics, Mathematics, and Mathematical Biology.

Mathematics faculty members are committed to educating students in the scientific and engineering environment. Through mathematics courses, students will develop their logical reasoning, critical thinking, technical communication and computational skills.

The department serves students in disciplines including the sciences, education, engineering and mathematics, as well as the community, by offering a wide range of interdisciplinary courses.

Students may register for freshman mathematics and statistics courses appropriate to their high school mathematics preparation and/or entrance examination scores as determined by the department.

The Mathematics Department is committed to success for all students. We provide corequisite programs for students to achieve college readiness and success in college-level math courses. Students who are not TSI complete or exempt in math are placed in a college-level math course with appropriate corequisite supports according to TSIA math scores, high school GPA, and previous math coursework. The Coordinator of Introductory Mathematics reviews each student's record with an academic advisor to assess readiness and determine placement before the student registers for an introductory math course. Developmental corequisite courses (MATH 0302, NCBM 0101 and NCBM 0102) receive a grade of credit/non-credit, which is not calculated into a student's grade point average. MATH 0302, NCBM 0101 and NCBM 0102 do no count for any degree plan requirement, though these courses do count toward satisfactory academic progress (SAP) for financial aid eligibility. MATH 0302 Developmental Mathematics is a 3 credit, 3-hour, small section developmental corequisite math course designed to teach foundational concepts and skills and support success in entry level college math courses. NCBM 0101 and NCBM 0102 are 1 credit, 2-hour, non-course based corequisite support lab sections, which provide targeted one-on-one support for success in entry level math courses. MATH 0302, NCBM 0101 and NCBM 0102 are not offered at TAMU-K as standalone courses.

Undergraduate Certificate in SAS Programming and Data Analysis

Admission Requirements

The certification is open to all degree-seeking undergraduate students as well as those registered as non-degree-seeking (transient) students. A student must be in good academic standing and may not be on academic probation of any kind. A student must have earned a grade of *B* or higher in a 1000-level introductory statistics course or its equivalent (must receive approval of the certificate director). The course offered at TAMU-K that meets this requirement includes STAT 1342. Students who have not taken a 1000-level statistics course or equivalent may enroll in one of two courses, STAT 4301 or STAT 4303, as a prerequisite to the certificate program. Students who have earned a grade of *B* or higher in STAT 4301 or STAT 4303 will also have that course counted toward one of the three elective courses for SAS certification, provided the instructor of these two courses also covers the corresponding SAS material appropriate for these courses.

Application Procedure

Students apply to the certification program via an online form accessible on the department's website. The form is automatically sent to the program director no later than four weeks after the start of the last class in the certificate sequence. A student's standing relative to the certificate requirements will be evaluated and, if the student is qualified, he or she will be sent specific instructions on required evaluation materials to complete certification. In case the student is not qualified or is deemed to be making insufficient progress toward the certificate, he or she will be notified accordingly.

Program of Study

The undergraduate certificate requires 12 credit hours consisting of one 4000-level core course and three elective courses selected from the list below with a minimum of a *B* grade in each course. All elective courses are at the 4000 level and have a SAS component. Courses in the certificate program are shown below. Most of these courses will initially be taught as STAT 4390.

Code	Title	Semester Credit Hours
Required Core Course		
STAT 4390	Selected Topics in Statistics	3
Elective Courses (Select Three)		
STAT 4301	Biostatistics	3
STAT 4303	Statistical Methods	3
STAT 4390	Selected Topics in Statistics	3

Additional courses will be added as needed.

Department Faculty

Agarwal, Ravi P Professor, Department of Mathematics; M.S., Agra University (India); Ph.D., Indian Institute of Technology (India).

Ahangar, Reza R Professor, Department of Mathematics; B.S., Tehran University (Iran); M.S., The Catholic University of America; Ph.D., The Catholic University of America.

Ahmed, Aden O Associate Professor, Department of Mathematics; B.S., Université Joseph Fourier (France); M.S., Portland State University; Ph.D., Portland State University.

Allred, Polly Senior Lecturer, Department of Mathematics; B.S., Utah State University; M.S., Utah State University; Ed.D., Texas A&M University-Kingsville.

Fowler, Betty Lou Lecturer II, Department of Mathematics; B.S., North Georgia College; M.A., University of Central Arkansas.

Hodis, Simona Associate Professor, Department of Mathematics; B.Sc., Universitatea Al.I.Cuza (Romania); M.Sc., McMaster University (Canada); Ph.D., University of Western Ontario (Canada).

Kim, Dongwook Assistant Professor, Department of Mathematics; B.A., Chung Ang University (South Korea); M.A., University of Georgia; Ph.D., New Jersey Institute of Technology.

Muzheve, Michael T Associate Professor, Department of Mathematics; Chair; B.S., University of Zimbabwe (Zimbabwe); M.Phil., University of Zimbabwe; M.S., Texas A&M University; Ph.D., Texas A&M University.

Singh, Sarjinder Professor, Department of Mathematics; B.S., Punjab Agricultural University (India); M.S., Punjab Agricultural University (India); Ph.D., Punjab Agricultural University (India).

Torres, Ramiro Senior Lecturer, Department of Mathematics; B.S., Texas A&M University-Kingsville; M.S., Texas A&M University-Kingsville.

Zuo, Lihua Assistant Professor, Department of Mathematics; B.S., Nanjing University of Science and Technology (China); M.S., Fudan University (China); Ph.D., Texas A&M University.

Emeritus

Cecil, David Professor of Mathematics, Department of Mathematics; B.A., Tulsa University; M.S., Oklahoma State University; Ph.D., Oklahoma State University.

Mathematics (MATH)

MATH 0302 Developmental Algebra **3 SCH (3-0)**
The mathematic skills necessary for success in college-level mathematics. Topics include real number operations, linear and quadratic equations, graphing linear and nonlinear equations, simplifying polynomial, rational and radical expressions, basic probability and geometry, and mathematical and statistical reasoning. Course does not count toward any degree. Placement based on student ACT/SAT, TSIA and/or placement test scores. Credit/Non-credit.

MATH 1314 College Algebra **3 SCH (3-0)**
College-level topics in algebra including functions, graphs, variation, piecewise defined functions, equations of lines, elementary curve fitting, quadratic equations and functions, systems of linear and nonlinear equations, composition of functions, inverse functions, exponential and logarithmic functions and applications related to these topics. Prerequisite: two years of high school algebra and appropriate scores on mathematics placement tests.

MATH 1316 Trigonometry **3 SCH (3-0)**
Fundamental notions and definitions, functions of angles, logarithms, circular measure, solution of triangles. Required of all engineering students. Prerequisites: two years of high school algebra and appropriate scores on mathematics placement tests, or MATH 1314 (MATH 1314 and MATH 1316 may be taken concurrently.)

MATH 1324 Math for Bus and Econ I **3 SCH (3-0)**
A course designed for students in business administration. Selected topics from finite mathematics including: linear inequalities, vectors, matrices, linear programming and probability. Prerequisites: two years of high school algebra and appropriate scores on mathematics placement tests.

MATH 1325 Math for Bus and Econ II **3 SCH (3-0)**
Applications of the theory of extrema. Area under a curve and its applications. Introduction to statistical measures. Prerequisite: MATH 1314 or MATH 1324.
Fee: $5.00

MATH 1334 Contemporary Mathematics **3 SCH (3-0)**
An introduction to several contemporary applications of mathematics for the nonmajor. Emphasis is on the variety of problems which can be modeled and solved by analytic and quantitative means. Topics will vary, but may include such as: applications of graph theory to management problems; encoding and encrypting information; problems of social choice-fair division, voting systems, conflict; topics in geometry; and data analysis. Prerequisites: Appropriate scores on mathematics placement tests.

MATH 1348 Analytic Geometry **3 SCH (3-0)**
Equations and their graphs. Cartesian and polar coordinates, the straight line, circles and conic sections. Operations with vectors, the dot and cross product. Prerequisites: MATH 1314 and MATH 1316.

MATH 1350 Fundamentals of Mathematics I **3 SCH (3-0)**
Problems from number theory, number systems, systems of operations and proportional reasoning. Requires approaching problems from multiple perspectives, drawing connections among those perspectives and strengthening flexibility and fluency in mathematical thinking and communicating. Not applicable for credit in the physical sciences or engineering. Prerequisite: MATH 1314 or higher.

MATH 1351 Fundamentals of Mathematics II **3 SCH (3-0)**
Problems from probability, statistics, measurement, geometry and spatial thinking. Requires approaching problems from multiple perspectives, drawing connections among those perspectives and strengthening flexibility and fluency in mathematical thinking and communicating. Not applicable for credit in the physical sciences or engineering. Prerequisite: MATH 1350.

MATH 2413 Calculus I **4 SCH (3-2)**
Limits and continuity. Definition of the derivative of a function and techniques of differentiation. Derivatives of various functions, to include rational, exponential, logarithmic, trigonometric and their inverses. Maximizing or minimizing a function, curve sketching, and rate of change problems; L'Hospital's rule. Introduction to integration, the Fundamental Theorem of Calculus, applications to areas; introduction to numerical integration. Prerequisite: MATH 1348.
Fee: $15.00

MATH 2414 Calculus II **4 SCH (3-0-2)**
Continuation of MATH 2413. Integration of logarithmic, exponential, and trigonometric functions. Techniques of integration. Applications of the integral to problems involving volumes, work, arc length, and fluid pressure. Infinite sequences and series, power series expansion of function. Calculus with parametric curves, and polar coordinates. Prerequisite: MATH 2413.
Fee: $15.00

MATH 3320 Differential Equations **3 SCH (3-0)**
The ordinary differential equations of physics, chemistry and engineering; methods for their solution and the properties of their solution. Prerequisite: MATH 2414.
Fee: $15.00

MATH 3325 Intro Mathematical Proofs (WI) **3 SCH (3-0)**
Principles and techniques of discovering and writing correct mathematical proofs. Independently prove theorems from various areas in mathematics, which may include topics from logic, the structure of the real number system, number theory, geometry and algebra. Prerequisite: MATH 2413.

MATH 3352 Applied Fundamentals of Math **3 SCH (3-0)**
Applied projects in selected areas of mathematics, such as number systems, systems of operations, proportional reasoning, probability, statistics, measurement, and geometry. Emphasis on understanding pedagogical content for pre-service teachers in mathematics. Planning, implementing and assessing mathematics activities during a two-week summer camp for area youth. Prerequisite: MATH 2413.

MATH 3360 Modern Geometry **3 SCH (3-0)**
Historical review of set theory logic and applications in Euclidean Geometry, Hilbert's approach and revision of Euclid's postulates, rewriting of Euclid's fifth postulate, Axiomatic approach to modern Geometry, Foundations of non-Euclidean geometry. Prerequisite: MATH 3325.

MATH 3370 Discrete Mathematics **3 SCH (3-0)**
This course covers many topics in mathematics which are important in computer science. Some of these topics are sets, relations, functions, algorithms, graphs, monoids, lattices, Boolean algebras and graphs. Prerequisite: 3 semester hours of advanced mathematics.
Fee: $5.00

MATH 3371 Prob Solving with Computers **3 SCH (3-0)**
Brief historical overview of computing and computers; strategies for solving problems by computers; programming in a higher level language. Students will be exposed to problem solving using technology, graphing calculator, and computer algebra system. Prerequisite: MATH 2413.

MATH 3390 Selected Topics in Math   **3 SCH (3-0)**
Different topics will be covered at varying times. May be repeated for credit with consent of the instructor. Prerequisite: 3 semester hours of advanced mathematics.

MATH 3415 Calculus III **4 SCH (3-0-2)**
Continuation of MATH 2414. Vector operations in 2 and 3 dimensions, lines, planes; vector functions, space curves, partial derivatives, curvature; multivariable calculus, optimization, Lagrange multipliers; multiple integral; vector fields, theorems of Green, Gauss and Stokes. Prerequisite: MATH 2414.
Fee: $15.00

MATH 4321 Real Variables **3 SCH (3-0)**
The real number system, its structure and properties. Properties of real functions and sequences, including uniform continuity and the Cauchy criterion. Introduction to the theory of sets. Theory and application of the derivative. Introductory concepts of function spaces, norms and metrics. Prerequisite: 6 semester hours of advanced mathematics, including MATH 3325.

MATH 4340 Modern Algebra **3 SCH (3-0)**
Properties of the Integers: divisibility, prime factorization and congruences. Integral domains, rings and fields. Groups, permutations and cosets. A historical development of these topics is included. Prerequisite: MATH 3325.

MATH 4341 Linear Alg and Matrix Theory **3 SCH (3-0)**
Vector spaces and their linear subspaces. Representation of linear transformations by matrices. Normal forms, eigenvalues, special transformations and applications. Prerequisite: 6 semester hours of advanced mathematics.
Fee: $15.00

MATH 4342 Algebraic Structures **3 SCH (3-0)**
An intensive axiomatic study of groups, rings, polynomial rings, fields and modules, along with their principal substructures. Emphasis on classification and structure theorems. Prerequisite: 6 hours of advanced mathematics or consent from instructor.

MATH 4351 Mathematical Theory of Games **3 SCH (3-0)**
Introduction to game theory. Topics include: combinatorial and strategic games, backward induction, payoffs, cooperative and non-cooperative games, mixed strategies, equilibria, repeated games and finite automata, common knowledge and incomplete information, the prisoner's dilemma. Selected applications to economics, biology, computer science, and political science. Prerequisite: MATH 2414 or consent of instructor.

MATH 4370 Vector Analysis **3 SCH (3-0)**
Vector algebra and geometry. Scalar and vector products. Vector functions and motion in polar coordinates. Scalar and vector fields with applications to line and surface integrals. Prerequisites: MATH 3320 and MATH 3415 or their equivalents.

MATH 4371 Laplace Transformation **3 SCH (3-0)**
An introduction to the theory of the Laplace Transformation. Applications to the solution of ordinary and partial differential equations, integral equations, difference equations and integro-differential equations. An introduction to other types of integral transformations. Prerequisites: MATH 3320 and MATH 3415 or their equivalents.

MATH 4372 Math for Physics and Eng I **3 SCH (3-0)**
Infinite series, matrix methods, vector analysis, applied multivariate calculus and Fourier series. Prerequisites: MATH 3320 and MATH 3415 or their equivalents.

MATH 4373 Application of Matrix Methods **3 SCH (3-0)**
Matrices and their inverses, determinants, eigenvalues and eigenvectors, Jordan canonical forms. Applications to simultaneous linear equations, matrix calculus and linear differential equations. Prerequisites: MATH 3320 and MATH 3415.
Fee: $5.00

MATH 4374 Numerical Analysis **3 SCH (3-0)**
The mathematical formation of the concepts in numerical analysis. These concepts include the theory of errors, roots of equations, interpolation, linear systems of equations, numerical differentiation and integration and solutions of ordinary differential equations. Prerequisites: MATH 3320 and MATH 3415.

MATH 4390 Selected Topics in Mathematics **3 SCH (3-0)**
Different topics will be covered at varying times. May be repeated for credit with consent of instructor. Prerequisite: 3 semester hours of advanced mathematics.

MATH 4399 Capstone Experience in Math **3 SCH (3-0)**
Designed to integrate mathematical standards and skills of mathematics majors. Students will demonstrate their ability to organize and synthesize mathematical knowledge; and design, implement, and present an advanced project in mathematics or mathematics education. Prerequisite: Senior standing in mathematics.

Non-Course Based Option Courses

NCBM 0101 Non-Course Based Option Math **1 SCH (0-2)**
A non-course based option to accelerate developmental match students and support success in college level mathematics. Students must be concurrently registered in a gateway math course (MATH 1314, MATH 1324, MATH 1334, or STAT 1342). Placement is based on mathematics TSIA score and multiple measures (holistic) assessment. Credit/Noncredit.

NCBM 0102 BASE NCBO Developmental Math **1 SCH (0-2)**
A basic academic skills education non-course based option to support students in developing skills, strategies, and reasoning needed to succeed in mathematics, including communication and appropriate use of technology. Students must be concurrently registered in MATH 0302. Placement is based on mathematics TSIA scores and multiple measures (holistic) assessment. Credit/Noncredit.

Statistics (STAT)

STAT 1342 Elementary Statistics **3 SCH (3-0)**
Elementary description of tools of statistics inference, including empirical and theoretical distributions, probability, sampling, treatment of both continuous and discrete data, correlation and applications to practical problems. Prerequisites: Two years of high school algebra and appropriate scores on math placement tests.
Fee: $5.00

STAT 2342 Statistical Analytics **3 SCH (3-0)**
Foundation course in statistical analysis, with emphasis on methods and interpretation of results, review of probability and common distributions, sampling distributions of mean, proportion, and variance; Central Limit Theorem; hypothesis testing, confidence interval, power of a test, sample-size calculation, contingency tables, chi-squared test, and introduction to ANOVA. Prerequisites: STAT 1342 or equivalent.

STAT 3331 Intro to Nonparametric Stats **3 SCH (3-0)**
The basic foundation for nonparametric statistical methods. Focus on methods and interpretation of the results. Measure of scales (nominal, ration, and interval) and overview of analyzing data having these scales of measurements using nonparametric methods. Emphasis on one-and-two sample tests of locations using standard nonparametric methods. Prerequisites: STAT 1342 or equivalent.

STAT 4301 Biostatistics **3 SCH (3-0)**
For students in biology, health sciences, human sciences, and wildlife science. Descriptive and inferential statistics, basic probability concepts, probability distributions, estimation, hypothesis testing, correlation, simple linear regression, principles of epidemiology, statistical vs. clinical significance, and quasi-statistical methods. Prerequisite: MATH 1314.
Fee: $15.00

STAT 4303 Statistical Methods **3 SCH (3-0)**
Calculus-based probability, discrete and continuous random variables, joint distributions, sampling distributions, the central limit theorem, descriptive statistics, interval estimates, hypothesis tests, ANOVA, correlation, and simple regression. Prerequisite: MATH 2414.
Fee: $15.00

STAT 4350 Probability **3 SCH (3-0)**
Sample spaces, combinatorics, independence, conditional probability and Bayes' rule. Discrete and continuous probability distributions, Chebychev's inequality and limit theorems. Prerequisite: MATH 3315.

STAT 4351 Math Theory of Statistics **3 SCH (3-0)**
Sampling distributions, estimation properties and methods, testing hypothesis, power of tests and likelihood ratios. Prerequisites: STAT 4350 or the equivalent and 3 semester hours of advanced mathematics.

STAT 4390 Selected Topics in Statistics **3 SCH (3-0)**
Topics in statistics not adequately covered in regular courses. This course may be repeated for credit as topic changes. Prerequisite: 3 semester hours of advanced mathematics or statistics.

Majors

- Mathematics with Teaching Certification, B.S.
- Mathematics, B.A.
- Mathematics, B.S.

Minors

- Applied Statistics, Minor
- Mathematical Biology, Minor
- Mathematics, Minor