DEPARTMENT OF MATHEMATICS AND STATISTICS

About

Chair
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Mission

The faculty of the Department of Mathematics and Statistics will provide all students with the opportunity to receive an educational experience in mathematics and statistics of the highest quality, both inside and outside the classroom. By actively engaging in research in mathematics, mathematics education, and/or statistics, the faculty will promote quality scholarship among each other as well as our students.

Contact Information
(936) 294-1564

Website
Department of Mathematics and Statistics (http://www.shsu.edu/academics/mathematics-and-statistics)

Highlights

- Host for annual mathematics conference on teaching of mathematics
- Home of Reeves Center for Mathematics Education
- Direct a variety of undergraduate and graduate research programs
- Provide undergraduate and graduate student presentations at local and national mathematics meetings
- Provide undergraduate and graduate student presentations at COTS, JSM and other statistical meetings
- Coordinate numerous grants with government and education agencies
- Encourage rigorous academic research from interested undergraduates

Career Opportunities

- Accounting and Finance
- Computer Programming
- Sales and Marketing
- Management and Related Positions
- Actuary
- Computer Systems Analysis
- Engineering
- Statistics
- Mathematics
- Operations Research
- Modeling
- Academic Positions - High School or College

- Master of Arts in Mathematics (catalog.shsu.edu/archives/2017-2018/graduate/college-departments/science-and-engineering-technology/mathematics-statistics/mathematics-education-ma)
- Master of Science in Mathematics (catalog.shsu.edu/archives/2017-2018/graduate/college-departments/science-and-engineering-technology/mathematics-statistics/mathematics-ms)
- Master of Science in Statistics (catalog.shsu.edu/archives/2017-2018/graduate/college-departments/science-and-engineering-technology/mathematics-statistics/statistics-ms)

Student Organizations

- Mathematical Association of America (MAA)
- Pi-Mu-Epsilon Mathematics Honor Society
- Ruth Lane Math Society
- Stat Club

Scholarships

The Department of Mathematics and Statistics offers several scholarships each year and Sam Houston State University offers additional, university-wide scholarships. Additional fellowships are available for students engaged in undergraduate research. For information on departmental scholarships, contact the Department of Mathematics and Statistics. Information on University scholarships may be obtained from the Financial Aid and Scholarships Office (http://www.shsu.edu/dept/financial-aid/scholarships) or telephone (936) 294-1774.

Mathematics

MATH 5360. Special Topics. 3 Hours.
Topics and courses are selected to suit individual needs of students. Methods of independent study and research are stressed. The course may be repeated for additional credit. Credit 3. Prerequisite: Consent of program coordinator.

MATH 5361. Theory & App Of Probability. 3 Hours.
Topics include probability axioms and properties, conditional probability, random variables, probability distributions, moment generating functions, laws of large numbers, and the Central Limit Theorem. Also listed as STAT 5361 . Credit 3. Prerequisite: STAT 4372 (or equivalent) or consent of the instructor.

MATH 5370. Fourier Analysis & Application. 3 Hours.
This course is a study of applied harmonic analysis. Topics include Fourier analysis, wavelet analysis, and applications of these topics. Credit 3. Prerequisite: MATH 4366 or MATH 5388 or the consent of the instructor.

MATH 5380. Research Project In Math Edu. 3 Hours.
In this course, the student will develop a project based on one of the core areas (Algebra, Geometry, Analysis, or Probability and Statistics) appropriate for use in teaching. This course is a capstone for candidates pursuing the degree of MA of Mathematics. Credit 3. Prerequisites: MATH 5386 , MATH 5387 , MATH 5388 , MATH 5389 .

MATH 5381. Algebra:Structr & Applications. 3 Hours.
This course includes the study of algebraic structures (such as groups, rings, integral domains, and fields) and their properties, and activities and concepts related to the algebra of real numbers that are applicable to middle school teachers. The course is designed for in-service middle school mathematics teachers. Credit 3. Prerequisite: None.

MATH 5382. Discrete Math for Teachers. 3 Hours.
This course will include a study of graph theory, combinatorics and recursion, social choice and apportionment, algorithms, and iteration, with an emphasis on real-world problem solving applications and mathematical connections to the school curriculum. This course is specifically designed for middle and high school teachers, with a mathematics specialization, obtaining a Master's Degree in Education with a minor in mathematics. Credit 3. Prerequisite: Middle of secondary school mathematics certification, or equivalent.

MATH 5383. Smnr Geo & Msurmt Elem Tchrs. 3 Hours.
This course will include a study of congruency, similarity, transformations, coordinate geometry, and measurement. It is specifically designed for elementary school teachers with a mathematics specialization who wish to obtain the master's degree in elementary education with a minor in mathematics. Credit 3. Prerequisites: Elementary school mathematics certification and MATH 3383 or equivalent.

MATH 5384. Smnr Mth Sys Elem Tchrs. 3 Hours.
This course will include a study of the development of the natural number system, the development of the integers, the development of the rational number system, and the development of the real number system. It is specifically designed for elementary school teachers with a mathematics specialization who wish to obtain the master's degree in elementary education with a minor in mathematics. Credit 3. Prerequisites: Elementary school mathematics certification and MATH 3384 or equivalent.

MATH 5385. Math Seminar For Jr H S Techrs. 3 Hours.
This course includes topics from arithmetic, algebra, geometry, number theory and other mathematical areas at a level appropriate for junior high school teachers. Credit 3. Prerequisite: Consent of instructor.

MATH 5386. Smnr In Algebra For Teachers. 3 Hours.
This course consists of a survey of several abstract algebraic systems including groups, rings, integral domains, and fields. Credit 3. Prerequisite: Certification in secondary school mathematics and MATH 3377 or equivalent.

MATH 5387. Smnr In Geometry For Teachers. 3 Hours.
This course is a study of topics in geometry including constructions and transformations. Credit 3. Prerequisites: Certification in secondary school mathematics and MATH 3363 or equivalent.

MATH 5388. Smnr In Analysis For Teachers. 3 Hours.
This course includes topics from set theory, number systems, functions, real sequences, limits, continuity, differentiation and integration. Credit 3. Prerequisite: Certification in secondary school mathematics and MATH 1430 or equivalent.

MATH 5389. Smnr Prob & Stat For Tchrs. 3 Hours.
This course includes topics from probability theory, distribution functions, descriptive statistics, and inferential statistics. Credit 3. Prerequisites: Certification in secondary school mathematics and MATH 3379 or equivalent.

MATH 5395. Digital Image Processing. 3 Hours.
The emphasis of this course is on the analysis of digital image processing algorithms used for solving problems in areas such as image enhancement and restoration, image registration, pattern recognition, and image segmentation. Credit 3. Prerequisite: MATH 3377 and programming experience.

MATH 5396. Optimization. 3 Hours.
The emphasis of this course is on modern algorithms and computational methods needed for solving optimization problems. Applications to current industrial problems will be given, and the theory of operations research will be developed. Credit 3. Prerequisites: MATH 3377 and MATH 2440 , or consent of instructor.

MATH 5397. Discrete Mathematics. 3 Hours.
Discrete structures are emphasized in this course, which includes a study of combinatorics, graph theory, and number theory. The applications of these structures in computers and communications will be highlighted. Credit 3. Prerequisites: MATH 4377 or MATH 5386 or equivalent.

MATH 6099. Research and Thesis. 1-3 Hours.

MATH 6332. Introduction To Topology. 3 Hours.
This course is a rigorous introduction to point set topology. Topics include continuity, connectedness, compactness, metrization theorems, separation theorems, and the Tychonoff theorem. Credit 3. Prerequisite: MATH 3300 or equivalent.

MATH 6333. Foundations Of Analysis I. 3 Hours.
This course is the first half of the analysis sequence. The analysis sequence includes topics from advanced multivariate calculus, normed linear spaces, measure theory, including Lebesgue and Borel measures, measurable functions, Lebesgue integration, and spaces of integrable functions. Credit 3. Prerequisites: MATH 4361 and MATH 4366 , equivalent, or consent of instructor.

MATH 6334. Foundations Of Analysis II. 3 Hours.
This course is the second half of the analysis sequence. The analysis sequence includes topics from advanced multivariate calculus, normed linear spaces, measure theory, including Lebesgue and Borel measures, measurable functions, Lebesgue integration, and spaces of integrable functions. Credit 3. Prerequisite: MATH 6333 or consent of instructor.

MATH 6335. Algebra I. 3 Hours.
This course is in the first half of the algebra sequence. The algebra sequence will include Group and Ring theory. Special topics include groups, group actions, the Sylow Theorems, rings, modules, fields, field extensions, and an introduction to Galois Theory. Credit 3. Prerequisite: MATH 4377 or equivalent.

MATH 6336. Algebra II. 3 Hours.
This course is the second half of the algebra sequence. The algebra sequence will include Group and Ring theory. Specific topics include groups, group actions, the Sylow Theorems, rings, modules, fields, field extensions, and an introduction to Galois Theory. Credit 3. Prerequisite: MATH 6335 (Algebra I) or equivalent.

MATH 6340. Algebraic Geometry. 3 Hours.
This course will provide an introduction to algebraic geometry emphasizing both classical theory and the practical aspects of computations with polynomial ideals using Groebner bases. Topics include Groebner bases, affine varieties, morphisms and rational maps, elimination theory, the Nullstellensatz, primary decomposition, projective varieties, Grassmannians, and Hilbert Functions. Credit 3. Prerequisite: MATH 6336 .

MATH 6342. Algebraic Topology. 3 Hours.
An introduction to the concepts of homotopy and homology theories. The following topics will be included: The fundamental group, classification of surfaces, higher homotopy groups, cellular and/or simplicial homology. Credit 3. Prerequisite: MATH 6332 .

MATH 6352. Differential Geometry. 3 Hours.
This course examines the local and global geometric and topological properties of curves and surfaces in 3-dimensional Euclidean space. Topics will include curvature and torsion of space curves, mean and Guassian curvature of surfaces, and the Gauss-Bonnet theorem. In addition, the course will also examine smooth Riemannian manifolds, the curvature tensor, geodesics, and applications such as surfaces of constant mean curvature. Credit 3. Prerequisite: None.

MATH 6360. Special Topics In Mathematics. 3 Hours.
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MATH 6367. History of Adv Mathematics. 3 Hours.
This course examines the history of the development of modern mathematics, from the discovery of calculus, through the industrial revolution, into the modern age of computers and digital technology. Emphasis will be placed on the applications of calculus and the abstraction of geometry, analysis, and algebra which followed. Credit 3. Prerequisite: MATH 4367 or departmental approval.

MATH 6368. Numerical Linear Algebra. 3 Hours.
This course is a study of vector spaces and matrices. Topics include solving linear systems, least square methods, eigenvalue and eigenvector theory, and applications of these topics. Credit 3. Prerequisite: MATH 3377 or consent of instructor.

MATH 6373. Applied Analysis. 3 Hours.
This course studies properties of normed spaces and functions defined on normed spaces. Special emphasis is placed on Euclidean n-space. Topics include limits, continuity, differentiation, and integration. Credit 3. Prerequisite: MATH 4366 or MATH 5388 or consent of the instructor.

MATH 6376. Foundations of Applied Math. 3 Hours.
This course provides a comprehensive presentation of the standard methods of applied mathematics that are used when solving problems posed in engineering and science. Topics may include finite dimensional vector spaces, function spaces, integral equations, differential operators, calculus of variations, complex variable theory, transform and spectral theory, ordinary and partial differential equations, bifurcation theory, nonlinear waves, and asymptotic expansions, and perturbation theory. Credit 3. Prerequisites: MATH 3376 and MATH 3377 or their equivalents.

MATH 6377. Abstract Algebra. 3 Hours.
Algebraic structure is emphasized in this course, which includes a study of groups, rings, fields, and their applications in coding theory and cryptography. Credit 3. Prerequisite: MATH 4377 or MATH 5386 or consent of instructor.

MATH 6379. Functions Of Complex Variable. 3 Hours.
Included in this course are studies of the complex number system, analytic functions, integration theory and the calculus of residues. Additional topics of special interest to the class may be included. Credit 3. Prerequisite: Consent of instructor.

MATH 6394. Scientific Computation. 3 Hours.
Topics include solutions of equations, approximation and interpolation, numerical differentiation and integration, the fast Fourier transform, and numerical simulation. Also listed as COSC 6321. Credit 3. Prerequisites: MATH 2440 and some programming experience, or consent of instructor.

MATH 6398. Research And Thesis. 3 Hours.
Credit 3. Prerequisite: None.

Statistics

STAT 5111. Software For Stat Sciences. 1 Hour.
Topics include MINITAB, SAS, Maple and Scientific Workplace (or equivalents). This one-hour course is available for graduate students in all disciplines. Credit 1. Prerequisites: STAT 3380 (or equivalent), graduate standing, and consent of instructor.

STAT 5333. Dsgn & Anal Of Experiments. 3 Hours.
Topics include the design, analysis and interpretation of results from standard experimental design models including the completely randomized design, the randomized complete block, the incomplete block, factorial models, Latin squares, Greco-Latin squares, screening designs, fractional factorials, and general fixed, mixed and random effects ANOVA models. Credit 3. Prerequisite: STAT 4372 (or equivalent) or consent of instructor.

STAT 5360. Special Topics In Statistics. 3 Hours.
Topics and courses are selected to suit individual student needs. Methods of independent study and research are stressed. Such topics as stochastic processes, Markov chain models, game theory, remote sensing, statistical decision theory, survival analysis, longitudinal data analysis, time series analysis and pattern recognition may be included. Credit 3. Prerequisite: Consent of instructor.

STAT 5361. Thry & Appltn Of Probability. 3 Hours.
Topics include probability axioms and properties, conditional probability, random variables, probability distributions, moment generating functions, laws of large numbers and the Central Limit Theorem. Credit 3. Prerequisites: STAT 4372 (or equivalent) or consent of instructor.

STAT 5362. Thry & Appltn Of Statistics. 3 Hours.
Topics include point estimation, hypothesis testing, interval estimation, nonparametric statistics, regression, correlation, analysis of variance, robustness and model fitting. Credit 3. Prerequisites: STAT 5361 (or equivalent) or consent of instructor.

STAT 5364. Applied Multi Statistical Anal. 3 Hours.
Topics include the multivariate normal distribution, inferences about a mean vector, comparisons of several multivariate means, principal components analysis, clustering, discriminant and classification analysis. Credit 3. Prerequisites: STAT 4372 , or consent of instructor.

STAT 5365. Linear Statistical Models. 3 Hours.
Topics include the statistical properties of quadratic forms, the full-rank general linear statistical model, the less-than-full-rank model, the linear model structure of regression models, ANOVA models, ANCOVA models, the general characteristics of the fixed, mixed and random effects models and model diagnostics considerations. Credit 3. Prerequisite: STAT 4372 (or equivalent) or consent of instructor.

STAT 5366. Sampling Methods. 3 Hours.
Topics include the theory and applications of standard methods for performing scientific-based sampling. Among these are simple random sampling, cluster sampling, stratified random sampling, systematic sampling, probability proportional to size (pps) sampling, sampling from finite populations and ratio regression estimation. Credit 3. Prerequisite: STAT 4372 or consent of instructor.

STAT 5367. Reliability Anal & Qual Ctrl. 3 Hours.
Topics include measures of failure, reliability functions, failure models, life testing and censoring, system reliability, parameter estimation and testing, control charting, acceptance sampling plans, software reliability and process control. Credit 3. Prerequisite: STAT 4372 or consent of instructor.

STAT 5368. Regression Modeling & Analysis. 3 Hours.
Topics include model estimation and testing, simple and multiple regression models, residual analysis, variables selection, polynomial regression, multicollinearity, ridge regression, logistic regression and real data analysis and applications. Credit 3. Prerequisites: STAT 4372 or consent of instructor.

STAT 5369. Stat Computing & Consulting. 3 Hours.
This course consists of a detailed study of the SAS package including SAS/BASICS, SAS/STAT, SAS/GRAPH and SAS/IML with emphasis on applying these tools in a consulting environment. Techniques and principles important in working with representatives of user disciplines are included. Credit 3. Prerequisites: STAT 3380 and graduate standing, or consent of instructor.

STAT 5370. Nonparametric Statistics. 3 Hours.
Topics include order statistics, contingency analysis, rank tests (Wilcoxin signed-rank test, Mann-Whitney U test and others), distribution-free tests of location and scale, Kendallís tau and related areas. Prerequisites: STAT 4372 or consent of instructor.

STAT 5375. Statistical Methods for Agriculture. 3 Hours.
This course explores applications of statistical methods for making interpretations of qualitative and quantitative data in agricultural research. Topics include sampling and randomization, correlation and regression, methods of inference for means and proportions, and design of experiments. Credit 3. Prerequisite: None.

STAT 6099. Research and Thesis. 1-3 Hours.
This course continues the thesis research and concludes with a carefully written solution of the thesis problem and a satisfactory oral presentation of the results. Study must be supervised by a member of the graduate statistics faculty. Variable Credit (1-3). Prerequisite: STAT 6398 .

STAT 6366. Applied Bayesian Analysis. 3 Hours.
This course presents Bayesian methods and their application to fields such as agriculture, biology, criminal justice and medicine. Topics include basic models that use the binomial, normal, poisson and gamma distributions; complex models that apply Markov Chain Monte Carlo methods like the Gibbs sampler and the Metropolis-Hastings algorithm; model selection and evaluation of model adequacy. Software current to the discipline will be used to analyze data. Credit 3. Prerequisite: STAT 4372 or consent of instructor.

STAT 6375. Biostatistics. 3 Hours.
This course consists of the topics related to statistical methods in biomedical studies: Types of biomedical study designs, assessment of risk factors, measure of disease-exposure association, logistic regression, analysis of count data, analysis of event-time data, and resampling methods. Credit 3. Prerequisite: STAT 4372 or consent of instructor.

STAT 6376. Time Series Analysis. 3 Hours.
This course presents both classical and modern approaches to time series analysis. Topics include autoregressive integrated moving average models, exponential smoothing models, and time series regression methods. Emphasis is placed on building time series models for forecasting. Credit 3. Prerequisite: STAT 4372 or consent of instructor.

STAT 6398. Research And Thesis. 3 Hours.
This course includes a study of research methods in statistics, identification of an appropriate thesis problem and the preparatory work leading to a plan for its solution. Study must be supervised by a member of the graduate statistics faculty. Credit 3. Prerequisite: STAT 5362 .

STAT 7365. Stat Mthd For Decision Making. 3 Hours.

Topics covered are oriented toward statistical methods supporting the decision environment. Topics include estimation, hypothesis testing, statistical modeling and decision methods. Credit 3. Prerequisites: 3 Credit hour of graduate-level, introductory probability and statistics or the equivalent.

Chair: **Brian M Loft**

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