DEPARTMENT OF MATHEMATICS & STATISTICS

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

Mathematics is a powerful tool for solving practical problems, combining logic and precision with intuition and imagination. The basic goal of mathematics is to reveal and explain patterns - whether the pattern appears as electrical impulses in an animal's nervous system, as fluctuations in stock market prices, or as fine detail of an abstract geometric figure.

Mission

The Department of Mathematics and Statistics provides 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 and professional development, the faculty promote quality scholarship among themselves as well as our students.

Goals

The Department of Mathematics and Statistics strives to:

- advance the disciplines of mathematics, mathematics education, and statistics through quality research and teaching;
- prepare future mathematicians, mathematics educators and statisticians through high quality classroom and research experiences for undergraduate and graduate students; and
- offer high quality educational experiences for undergraduates of all majors through mathematics, mathematics education, and statistics service courses.

The Department undertakes the following efforts to support these goals:

- Directs a variety of undergraduate research programs
- Provides opportunities for undergraduate and graduate student travel to professional conferences
- Coordinates numerous grants with government and education agencies
- Offers discipline-related employment opportunities to students

Career Opportunities

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

Suggested Minors

- Chemistry
- Computer Science
- Economics
- Music
- Physics
- Pre-Med/Biology
- Statistics

Program Specific Requirements

Anyone considering a degree in Mathematics should consult an advisor in the Mathematics department prior to registering for any courses. Visit LDB 420 for more information.

- Bachelor of Arts, Major in Mathematics (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/ba-mathematics/)
- Bachelor of Science, Major in Data Science (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/bs-data-science/#planofstudytext)
- Bachelor of Science, Major in Mathematics (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/bs-mathematics/)
- Bachelor of Science, Double Major in Education and Mathematics (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/education/school-of-teaching-and-learning/bs-education-and-mathematics/)
- Bachelor of Science, Major in Mathematics: 4+1 MS, Mathematics (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/bs-mathematics-and-ms-mathematics/)
- Minor in Mathematics (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/minor-mathematics-without-teacher-certification/)
- Minor in Statistical Method (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/minor-statistical-method/)s
- Minor in Statistical Theory (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/minor-statistical-theory/)
- Minor in Statistics and Data Science (http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/mathematics-statistics/minor-statistics-and-data-science/)

Student Organizations

- Student chapter of the Mathematical Association of America (MAA)
- Student chapter of the American Mathematical Society (AMS)
- Pi-Mu-Epsilon Mathematics Honor Society
- Stat Club

Internships

Possible internships exist with NASA, the National Security Agency, Actuarial Firms, and the Oil Industry. However, federally-funded Research Experiences for Undergradautes (REUs) are the most popular programs among mathematicians over the summer. REU students spend 8 weeks of the summer at a different university, doing mathematics or statistics research. Not only are all expenses paid, a pretty generous stipend is earned at the end of the summer. For more information, see the NSF page on REUs. (http://www.nsf.gov/crssprgm/reu/list_result.jsp?unitid=5044)

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 at Office of Academic Scholarships (http://www.shsu.edu/dept/financial-aid/scholarships/).

Mathematics

MATH 0001. Math Intervention. 0 Hours.
NCBO Math Intervention. By department approval only.

MATH 0331. Developmental Mathematics. 3 Hours.
Students study the fundamental operations involving whole numbers, fractions, decimals and percents, ratio and proportion, interpretation of graphs, geometry, and introductory algebra, including axioms and properties of the real number system, fundamental operations involving algebraic expressions, and first and second degree equations and inequalities in one unknown. Credit in this course may not be applied toward graduation or classification of students by hours completed.

MATH 0333. Developmental Mathematics NCBO. 3 Hours.
Students in this course accelerate through the developmental mathematics sequence at Sam Houston State University in one term using innovative learning techniques and individualized programming. Topics include arithmetic operations, basic algebraic concepts and notation, geometry, and real and complex number systems, as well as study of relations and functions, inequalities, algebraic expressions and equations, with a special emphasis on linear and quadratic expressions and equations. This course is required for students who have not met readiness standards for math. Credit in this course will not be allowed to count toward graduation or computation of grade point average or classification of students by hours completed. (Course does not fulfill University degree requirements.)

MATH 1314. Pre Calculus Algebra. 3 Hours. [TCCN: MATH 1314]
Students engage in a brief review of introductory algebra, variation, elementary theory of equations, functions (including exponential and logarithmic), inequalities, systems of equations, and other related topics.
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1316. Plane Trigonometry. 3 Hours. [TCCN: MATH 1316]
Students study coordinate systems, circular functions, solutions of triangles, identities, trigonometric equations, and inverse functions.
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1324. Mathematics for Managerial Decision Making. 3 Hours. [TCCN: MATH 1324]
Students engage in a review of introductory algebra, equations, relations, functions, graphs, linear programming, systems of equations and matrices, and mathematics of finance.
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1332. College Mathematics. 3 Hours. [TCCN: MATH 1332]
This course is designed to meet the objectives of Component Area 2 of the Core curriculum for non-business and non-science related majors. Topics may include sets, counting principles, probability, logic, linear algebra, linear programming, and mathematics of finance, geometry, and calculus.
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1342. Elementary Statistics. 3 Hours. [TCCN: MATH 1342]
Students engage in a survey in elementary statistics in order to acquaint students with the role of statistics in society. Coverage may include graphical descriptive methods, measures of central tendency and variation, the basic concepts of statistical inference, the notion of estimators, confidence intervals, and tests of hypotheses. Course Equivalents: MATH 1369, STAT 1369
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1370. Introduction to Biomedical Statistics. 3 Hours.
This elementary statistics course is designed to foster critical thinking about data in healthcare-related settings. Coverage may include graphical and numerical descriptive methods; measures of central tendency and variation; the basic concepts of statistical inference; the notion of estimators, confidence intervals and tests of hypotheses. Data is analyzed with the help of software currently used in the profession, such as SPSS and/or Minitab.
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1384. Introduction to Foundations of Mathematics I. 3 Hours. [TCCN: MATH 1350]
Students study sets, systems of numeration, natural numbers, integers, number theory and rational numbers. Credit in this course is applicable only toward elementary/middle school certification.
Prerequisite: Passing score on the MATH TSI Assessment or equivalent.

MATH 1385. Introduction to Foundations of Mathematics II. 3 Hours. [TCCN: MATH 1351]
Students explore basic notions of Euclidean Geometry in two and three dimensions, ratio, proportions, concepts of congruence and similarity, transformational geometry and measurement. Credit in this course is applicable only toward elementary/middle school certification.
Prerequisite: MATH 1384 with a grade of C or better.

MATH 1410. Elementary Functions. 4 Hours. [TCCN: MATH 2412]
Elementary Functions and their applications, including topics from algebra, trigonometry and analytic geometry, are used to assist in the algebraic and graphical description of the following elementary functions: polynomial, rational, exponential, logarithmic, and trigonometric functions.
Prerequisite: C or better in MATH 1314, or a 540 on the new Math SAT, or a 21 on the Math ACT, or a 263 on the Next- Generation Advanced Algebra and Functions ACCUPLACER.

MATH 1420. Calculus I. 4 Hours. [TCCN: MATH 2413]
Students study limits and continuity, the derivative, techniques for differentiation of algebraic, logarithmic, exponential and trigonometric functions, applications of the derivative and anti-differentiation, definite integral, Fundamental Theorem of Calculus.
Prerequisite: C or better in MATH 1410, or an A or B in AP Calculus, or a 660 on the new Math SAT, or a 28 on the Math ACT, or a 276 on the Next-Generation Advanced Algebra and Functions ACCUPLACER.

MATH 1430. Calculus II. 4 Hours. [TCCN: MATH 2414]
Students study the definite integral and its applications, techniques of integration, improper integrals, Taylor's formula and infinite series.
Prerequisite: MATH 1420 with a grade of C or better.

MATH 2384. Functions and Graphs. 3 Hours.
The emphasis of this course is on functions and their multiple representations including linear, polynomial, logarithmic, exponential and logistic functions. This course may be applied only toward middle school teacher certification.
Prerequisite: MATH 1385 with grade of C or better.

MATH 2385. Fundamentals of Calculus. 3 Hours.
Students are introduced to the concepts and applications of calculus. This course may be applied only toward middle school teacher certification. Normally offered in the Fall and Spring.
Prerequisite: C or better in MATH 2384.

MATH 2395. Discrete Mathematics. 3 Hours. [TCCN: MATH 2305]
This is an applied course in discrete mathematical structures. Topics may include sets, logic, mathematical proof, computational complexity, relations, graphs, trees, boolean algebra, number theory, combinatorics, probability, recurrence relations, and finite state machines. This course is designed for computer science majors, so programming applications are emphasized.
Prerequisite: MATH 1420 and COSC 1436 with a grade of C or better.

MATH 2399. Mathematics for Managerial Decision Making. 3 Hours.
Students explore differential and integral calculus with applications in areas such as business and economics.
Prerequisite: MATH 1324 or MATH 1314.

MATH 2440. Calculus III. 4 Hours. [TCCN: MATH 2415]
Students study the calculus functions of several variables and topics in vector calculus including line and surface integrals, Green's Theorem, Divergence Theorem, and Stoke's Theorem.
Prerequisite: MATH 1430 with a grade of C or better.

MATH 3300. Introduction to Mathematics Thought. 3 Hours.
Students are introduced to sets, logic, the axiomatic method and proof. Writing enhanced. Normally offered in the Fall and Spring.
Prerequisite: Grade of C or better in MATH 1430 or consent of instructor.

MATH 3350. Theory of Interest. 3 Hours.
Students derive the mathematical principles behind financial instruments involving interest. Topics may include amount functions, interest rates and yields, force of interest, special annuity types, bonds, yield curves, and interest rate sensitivity. Also included is a discussion of the mathematics of financial derivatives. This course covers the content on which the joint Society of Actuaries/Casualty Actuarial Society Exam FM/2 on mathematical interest theory is based.
Prerequisite: Grade of C or better in Math 1430.

MATH 3363. Euclidean Geometry. 3 Hours.
Students study the modern development of Euclidean geometry and are provided a limited introduction to non-Euclidean geometry. Writing enhanced.
Prerequisite: MATH 3300 or consent of instructor.

MATH 3376. Differential Equations. 3 Hours. [TCCN: MATH 2320]
This course, in conjunction with MATH 4375, is intended to develop a basic competence in areas of mathematics that are used in solving problems from the physical sciences. This first course emphasizes the general solution of ordinary differential equations, including the Laplace transform and infinite series methods.
Prerequisite: Grade of C or better in MATH 2440 or concurrent enrollment.

MATH 3377. Introduction to Linear Algebra and Matrices. 3 Hours. [TCCN: MATH 2318]
Students study solving systems of linear equations, fundamental matrix theory (invertibility theorems, determinants), eigenvectors, and properties of linear transformations. Remaining topics are chosen from: Properties of general vector spaces, inner product spaces, and/or diagonalization of symmetric matrices.
Prerequisite: Grade of C or better in MATH 1420.

MATH 3379. Statistical Methods in Practice. 3 Hours.
Students study the organization and presentation of data, measures of central tendency, dispersion, and position, probability distributions for discrete and continuous random variables, sampling techniques, parameter estimation, and hypothesis testing. Emphasis is given to the use of statistics packages. Normally offered in the Fall, Spring, Summer I. Also offered as STAT 3379. Course Equivalents: STAT 3379
Prerequisite: Three (3) semester hours of college mathematics.

MATH 3380. Historical Perspectives of Mathematics. 3 Hours.
(SH Prior Course ID: MTH 380); This course is designed to present mathematical topics from a historical perspective. The number systems and computational methods of past cultures and civilizations are discussed, along with the development of number theory and trigonometry. Credit in this course is applicable only toward elementary/middle school teacher certification.
Prerequisite: C or better in MATH 1385.

MATH 3381. Introduction to Foundations of Mathematics III. 3 Hours.
Students study topics in proportions, percents, probability, data analysis, algebraic reasoning, and problem solving. Credit in this course is applicable only toward elementary/middle school certification. Normally offered in the Fall, Spring, and Summer.
Prerequisite: C or better in MATH 1385.

MATH 3382. Foundations of Middle School Mathematics. 3 Hours.
Students study relations, functions, coordinate geometry, logic, and history of mathematics. Credit in this course is applicable only toward middle school certification.
Prerequisite: C or better in MATH 2384.

MATH 3383. Geometric Measurement/Transformation. 3 Hours.
Students study measurement in one, two, and three dimensions, the metric system, transformational geometry, congruencies, similarities, geometric constructions, and coordinate systems. This course may be applied only toward middle school certification.
Prerequisite: C or better in MATH 2385.

MATH 3384. Foundations of Mathematics. 3 Hours.
Students are introduced to logic, concepts of proof, proof techniques, induction, and sets. The course may be applied only toward middle school certification. Writing enhanced.
Prerequisite: C or better in MATH 2385 or equivalent.

MATH 3386. Fundamentals of Probability and Statistics. 3 Hours.
Students are introduced to probability, descriptive statistics, and inferential statistics, including regression, confidence intervals, and the construction and interpretation of tables, graphs, and charts. Technology related to the above topics are incorporated into the course. This course may be applied only toward middle school certification.
Prerequisite: C or better in MATH 2385.

MATH 3387. Problem Solving-Middle School Mathematics. 3 Hours.
Students study problem-solving strategies appropriate for middle school or junior high mathematics. The course may be applied only toward middle school certification.
Prerequisite: C or better in Math 2385.

MATH 3394. Numerical Methods. 3 Hours.
Student study interpolation, approximations, solutions of equations, and the solution of both linear and nonlinear systems of equations.
Prerequisite: COSC 1436 and MATH 1430 with a grade of C or higher.

MATH 3396. Operations Research I. 3 Hours.
Students explore techniques for the application of the scientific method to decision making in business and government, which are presented through the formulation and interpretation of mathematical models for various specific real life problems.
Prerequisite: MATH 1430 with a grade of C or higher.

MATH 4090. Independent Study. 1-3 Hours.
This course is designed for advanced students to engage in independent study of an area of interest in mathematics under the close guidance of a faculty mentor. Variable credit (1 to 3).
Prerequisite: Consent of instructor.

MATH 4332. Topology. 3 Hours.
Students explore properties of geometric spaces that are preserved under deformation-stretching or twisting, but not breaking. Topics may include topological spaces, connectedness, compactness, manifolds, cell complexes, knot theory, knot invariants, Euler characteristic, fundamental group, classification of surfaces, and covering spaces.
Prerequisite: C or better in Math 3300.

MATH 4361. Introductory Analysis. 3 Hours.
Students engage in a more thorough treatment of the material traditionally considered in elementary calculus. Topics may include sets, functions, properties of the real number system and sequences. Normally offered in the Fall.
Prerequisite: C or better in MATH 3300 or consent of the instructor.

MATH 4366. Elementary Analysis. 3 Hours.
Students study limits, continuity, differentiation, Riemann integration, infinite series and sequences, and series of functions. Normally offered in the Spring.
Prerequisite: MATH 4361 with a grade of C or better.

MATH 4367. The Evolution of Mathematics. 3 Hours.
Students are introduced to the historical development of fundamental mathematical ideas from antiquity to the present. Writing Enhanced. Normally offered in the Fall.
Prerequisite: Grade of C or better in MATH 1430.

MATH 4368. Introduction to Number Theory. 3 Hours.
Students explore the theory of integers in depth. Topics may include: the division algorithm and Euclidean Algorithm; primes and the Fundamental Theorem of Arithmetic; modular arithmetic; Euler's phi function; the ring of units of an integer; quadratic reciprocity; and arithmetic functions.
Prerequisite: C or Better in Math 3300.

MATH 4369. Foundations of Analysis. 3 Hours.
Students apply advanced concepts in the analysis of functions of real variables, building upon the required undergraduate sequence in analysis for mathematics majors and providing further study for students interested in pursuing graduate work. Topics may include multivariate calculus, normed linear spaces, measure theory, measurable functions, Lebesgue integration, and spaces of integrable functions.
Prerequisite: C or better in MATH 4366, or consent of instructor.

MATH 4370. Special Topics in Mathematics. 3 Hours.
Normally, this course consists of readings and individual research appropriate for the undergraduate level with subject matter for study selected by mutual agreement of student and supervisor. However, special classes may be organized when there is sufficient student interest in a particular project. Writing enhanced. This course may be taken for Academic Distinction Credit. See Academic Distinction Program in this catalog.
Prerequisite: Six (6) semester hours of advanced college math and instructor consent.

MATH 4371. Theory and Applications of Probability and Statistics I. 3 Hours.
Students explore basic concepts and properties of probability, random variables, statistical distributions, measures of central tendency, variance, covariance, correlation, functions of random variables, sampling distributions, and the Central Limit Theorem. Also offered as STAT 4371. Normally offered in the Fall. Course Equivalents: STAT 4371
Prerequisite: MATH 1430.

MATH 4372. Theory and Applications of Probability and Statistics II. 3 Hours.
Topics include multivariate, conditional and marginal distributions, point and interval estimation, theory of estimation, maximum likelihood estimates, hypothesis testing, likelihood ratio tests, contingency analysis, and nonparametric statistics. Also offered as STAT 4372. Normally offered in the Spring.
Prerequisite: MATH 4371.

MATH 4375. Partial Differential Equations. 3 Hours.
Students solve problems involving partial differential equations from the natural sciences. Topics may include derivation of the heat/diffusion and wave equations, the method of separation of variables to solve the heat, wave, and Laplace equations on finite domains, Fourier series, Sturm-Liouville eigenvalue problems, the Fourier transform method to solve equations on infinite domains, the method of characteristics, and D'Alembert's solution of the wave equation.
Prerequisite: C or better in Math 3376.

MATH 4377. Algebraic Structures. 3 Hours.
Student study basic structures of abstract algebra: groups, rings, and fields. Topics may include elementary number theory, equivalence relations, groups, homomorphisms, cosets, Cayley's Theorem, symmetric groups, rings, polynomial rings, quotient fields, principal ideal domains, and Euclidean domains. Writing enhanced.
Prerequisite: C or better in MATH 3300 and MATH 3377.

MATH 4378. Abstract Algebra. 3 Hours.
Students study advanced topics from group theory and ring theory. Other topics may include group actions, the Sylow theorems, modules, fields, field extensions, and an introduction to Galois theory.
Prerequisite: C or better in MATH 4377 and consent of instructor.

MATH 4379. Complex Variables. 3 Hours.
Students explore the foundation of complex variables and analytic functions on the complex plane. Topics may include basic properties of complex-valued functions, such as domain, range, branch cuts, limits, and continuity. These topics are followed by the central property of analyticity and the use of Cauchy's Theorem in evaluating contour integrals.
Prerequisite: C or better in Math 2440.

MATH 4384. Survey of Mathematical Ideas. 3 Hours.
This course is designed to bring together and supplement the technical material of other mathematics courses in the mathematics teacher-education program and relate it to the mathematics curriculum of the secondary school. This course may be applied only toward teacher certification.
Prerequisite: Grade of C or better in MATH 3300; Advanced standing in mathematics.

MATH 4385. Mathematical Problem Solving. 3 Hours.
Students focus on solving mathematical problems, including the use of proof as well as graphical and numerical methods. The course extends and connects concepts from algebra, geometry, and calculus, including functions, graphs, complex numbers and number systems. This course may be applied only toward teacher certification.
Prerequisite: Grade of C or better in MATH 3300; Advanced standing in mathematics.

MATH 4395. Undergraduate Research. 3 Hours.
Students engage in special projects or topics in theoretical or applied mathematics. Each student pursues an approved project of interest guided by a mathematics faculty member. Each student is expected to demonstrate individual initiative in planning and conducting the research program or topic. This course may be taken for Academic Distinction credit.
Prerequisite: C or better in MATH 3300 and department approval.

MATH 4397. Combinatorics. 3 Hours.
Students examine permutations, combinations, Stirling numbers, Bell numbers, Catalan numbers, combinatorial proofs, the principle of inclusion-exclusion, the binomial theorem, integer partitions, recurrence relations, and generating functions. Additional topics may include graph theory, poset theory, matroid theory, computational complexity, Burnside's lemma, Ramsey numbers, and error-correcting codes.
Prerequisite: C or better in Math 3300.

MATH N014. Support for Pre-Calculus Algebra. 2 Hours.
This course is an accelerated introduction to the concepts of relations and functions, inequalities, algebraic expressions, and equations. Particular attention is given to absolute value, polynomial, rational, and radical expressions. Special emphasis will be given to linear and quadratic expressions and equations. Credit in this course may not be applied toward graduation or classification of students by hours completed. Variable Credit (0 to 2). Corequisite: This course must be taken concurrently with MATH 1314. Course Equivalents: MATH 0112
Prerequisite: A score of 310-349 on the TSI Assessment Test.

MATH N024. Support Math for Managerial Decision Making. 2 Hours.
This course is an accelerated introduction to the concepts of relations and functions, inequalities, algebraic expressions, and equations. Particular attention is given to absolute value, polynomial, rational, and radical expressions. Special emphasis will be given to linear and quadratic expressions and equations. Credit in this course may not be applied toward graduation or classification of students by hours completed. Variable Credit (0 to 2). Corequisite: This course must be taken concurrently with MATH 1324. Course Equivalents: MATH 0112
Prerequisite: A score of 310-349 on the TSI Assessment Test.

MATH N032. Support for College Math. 2 Hours.
This course is an accelerated introduction to the concepts of relations and functions, inequalities, algebraic expressions, and equations. Particular attention is given to absolute value, polynomial, rational, and radical expressions. Special emphasis will be given to linear and quadratic expressions and equations. Credit in this course may not be applied toward graduation or classification of students by hours completed. Variable Credit (0 to 2). Corequisite: This course must be taken concurrently with MATH 1332. Course Equivalents: MATH 0112
Prerequisite: A score of 310-349 on the TSI Assessment Test.

MATH N042. Support for Elementary Statistics. 2 Hours.
This course is an accelerated introduction designed to support students enrolled in MATH 1342. Students are expected to acquaint themselves with the role of statistics in society. Topics include graphical descriptive methods, measures of central tendency and variation, basic concepts of statistical inference, notion of estimators, confidence intervals, and tests of hypotheses. Credit in this course will not be applied toward graduation or classification of students by hours completed. Variable Credit (0 to 2). Corequisite: This course must be taken concurrently with MATH 1342. Course Equivalents: MATH 0112, MATH N069
Prerequisite: A score of 310-349 on the TSI Assessment Test.

MATH N084. Support for Intro Foundations of Math I. 2 Hours.
This course is an accelerated introduction designed to support students enrolled in MATH 1384. Students are expected to practice communication skills and participate in hands-on activities, including the use of mathematics manipulatives and technology. Topics will include problem solving, reasoning, communication, connections, and representation. Credit in this course may not be applied toward graduation or classification of students by hours completed. Variable Credit (0 to 2). Corequisite: This course must be taken concurrently with MATH 1384. Course Equivalents: MATH 0112
Prerequisite: A score of 310-349 on the TSI Assessment Test.

Statistics

STAT 3379. Statistical Methods in Practice. 3 Hours.
Students study organization and presentation of data; measures of central tendency, dispersion, and position; probability distributions for discrete and continuous random variables, sampling techniques, parameter estimation, and hypothesis testing. Emphasis is given to the use of statistical packages. Also offered as MATH 3379. Course Equivalents: MATH 3379
Prerequisite: Three (3) semester hours of college mathematics.

STAT 3380. Statistical Design and Analysis of Experiments. 3 Hours.
Students study sampling designs and hypothesis testing in analysis of variance, analysis of covariance, and regression analysis. Design characteristics, model diagnostics, and hypothesis testing are emphasized and work is required on real data. The MINITAB and SAS statistics packages are applied. Normally offered in the Spring semester.
Prerequisite: STAT 3379 or MATH 3379.

STAT 3381. Sample Survey Methods. 3 Hours.
Students study the principles needed in planning and conducting sample surveys. Topics may include random, stratified, systematic, and cluster sampling methods as well as sub sampling techniques.
Prerequisite: STAT 3379 or MATH 3379.

STAT 3382. Introduction to Statistical Computing. 3 Hours.
Students examine introductory topics in statistical computing and learn to use various software products related to statistical computing, such as the SAS, SPSS, and R statistical packages. Students also write code to perform calculations.
Prerequisite: STAT 3379.

STAT 3385. Statistical Methods for Data Science. 3 Hours.
Students examine data science methods, techniques, and applications. Topics include data cleansing and manipulation, visualization, and summarization. Additionally, students will explore programming and computing software such as Python and R.
Prerequisite: MATH/STAT 3379.

STAT 3390. Probability and Statistics for Sciences. 3 Hours.
Students study the fundamentals of probability, random variables and their probability distributions, and expected values. Topics include Student t-, F-, and Chi-Square distributions, the confidence interval; hypothesis testing; regression analysis, and ANOVA.
Prerequisite: MATH 1420.

STAT 4090. Independent Study. 1-3 Hours.
This course is designed for advanced students to engage in independent study of an area of interest in statistics under the close guidance of a faculty mentor. Prerequisite: Consent of instructor. Variable credit (1 to 3).
Prerequisite: Consent of instructor.

STAT 4370. Special Topics in Statistics. 3 Hours.
This course is designed to accommodate independent study and research with content determined by mutual agreement of student and supervisor. However, it may also be taught as a special organized class when there is sufficient student interest in a particular project. Such topics as survival analysis, modeling and analysis, categorical data analysis, biostatistics, Monte-Carlo techniques, and bootstrapping may be included. This course may be taken for Academic Distinction credit. (See Academic Distinction Program in this catalog.) May be repeated for credit.
Prerequisite: MATH 3379 or STAT 3379, and consent of instructor.

STAT 4371. Theory and Applications of Probability and Statistics I. 3 Hours.
Students explore basic concepts and properties of probability, random variables, statistical distributions, measures of central tendency, variance, covariance, correlation, functions of random variables, sampling distributions, and the Central Limit Theorem. Also offered as MATH 4371. Normally offered in the Fall semester. Course Equivalents: MATH 4371
Prerequisite: MATH 1430.

STAT 4372. Theory and Applications of Probability and Statistics II. 3 Hours.
Topics include multivariate, conditional and marginal distributions, point and interval estimation, theory of estimation, maximum likelihood estimates, hypothesis testing, likelihood ratio tests, contingency analysis, and nonparametric statistics. Also offered as MATH 4372. Normally offered in the Spring.
Prerequisite: STAT 4371.

STAT 4373. Nonparametric Statistics. 3 Hours.
Students study chi-square goodness-of-fit testing and inferences concerning location and scale. Specific tests include the sign test, Wilcoxon signed-rank test, the Kruskal-Wallis test, tests for randomness and trends, and contingency analyses.
Prerequisite: STAT 3379 or MATH 3379.

STAT 4374. Regression Modeling & Analysis. 3 Hours.
Student study model estimation and testing, model diagnostics, residual analysis, variables selection, and multicollinearity. Work is required on real data with the use of the MINITAB and SAS statistics packages.
Prerequisite: STAT 3379 or MATH 3379.

STAT 4375. Quality Control & Reliability. 3 Hours.
Students examine topics, such as attribute and variables control charts, process capability, acceptance sampling, probabilistic foundations of reliability, hazard functions, failure laws, and system reliability.
Prerequisite: MATH 3379 or STAT 3379.

STAT 4376. Time Series and Forecasting. 3 Hours.
Students examine topics, such as types and classification of time series, methods of forecasting, errors in forecasting, regression analysis for time series, decomposition methods, exponential smoothing, Box-Jenkins methods, nonseasonal and seasonal modeling, and transfer function and intervention models.
Prerequisite: MATH 3379 or STAT 3379.

STAT 4377. Introduction to Applied Bayesian Analysis. 3 Hours.
Students employ statistical methods and their applications using the Bayesian paradigm. Topics may include conditional probability, Bayes' Rule, likelihood ratios, hypothesis testing and credible intervals for population means and population proportions, and simple linear regression using Bayesian estimators. Software such as R, JAGS, WinBugs, and SAS may be used for data analysis.
Prerequisite: STAT 3379 or MATH 1430.

STAT 4390. Introduction to Statistical Learning. 3 Hours.
Students apply the tools needed for modeling and understanding complex data sets. Topics may include regression, logistic regression, Ridge Regression, Lasso Regression, classification and regression techniques, decision trees, and model selection techniques.
Prerequisite: STAT 3379.

Director/Chair: **Damon Martin Hay**

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