Mathematical Sciences Course Descriptions

MATH 1300 Computerized College Algebra with Applications (3 semester hours) This computer-based course is intended for students NOT continuing on to precalculus or calculus. Topics chosen from areas such as operations with fractions, exponents, inequalities, linear equations and graphs, use of algebra to model a variety of problems encountered in ordinary life. Cannot be used to satisfy major requirements for majors in the Schools of Natural Sciences and Mathematics or Management, or degree requirements for the School of Engineering and Computer Science. Credit given for only one of MATH 1300, 1306, or 1314. Prerequisite: High School Algebra II. (3-0) S

MATH 1306 College Algebra for the Non-Scientist (3 semester hours) This course is intended for students NOT continuing on to precalculus or calculus. The course is designed to develop both abstract thinking and a practical approach to problem solving. The emphasis is on understanding rather than purely computational skills. Topics include logic, sets, the real numbers, linear equations and their applications, functions, and graphs. Cannot be used to satisfy major requirements for majors in the Schools of Natural Sciences and Mathematics or Management, or degree requirements for the School of Engineering and Computer Science. Credit given for only one of MATH 1300, 1306 or 1314. Prerequisite: High School Algebra (3-0) Y.

MATH 1314 (MATH 1314) College Algebra (3 semester hours) Topics chosen from areas such as equations and inequalities, rational expressions, exponents, radicals and logarithms, functions, and graphs. Cannot be used to satisfy major requirements for majors in the Schools of Natural Sciences and Mathematics or Management, or degree requirements for the School of Engineering and Computer Science. Credit given for only one of MATH 1300, 1308, or 1314. Prerequisite: High School Algebra II. (3-0) S

MATH 1325 (MATH 1325) Applied Calculus I (3 semester hours) Functions and graphs, differentiation, maxima and minima, exponential and logarithmic functions, integration, applications of integrals. Cannot be used to satisfy degree requirements or majors in the School of Engineering and Computer Science or major requirements in the School of Natural Sciences and Mathematics. Credit given for only one of MATH 1325 or 2417. Prerequisite: MATH 1314 or equivalent. (3-0) S

MATH 1326 (MATH 1326) Applied Calculus II (3 semester hours) Applications of differential equations, functions of several variables, least squares modeling, multiple integrals, infinite series. Cannot be used to satisfy degree requirements for B.S. majors in Schools of Engineering and Computer Science or Natural Sciences and Mathematics. Credit given for only one of MATH 1326 or 2419. Prerequisite: MATH 1325. (3-0) S

MATH 2312 (MATH 2312) Precalculus (3 semester hours) Trigonometric functions, rational functions, exponential and logarithmic functions and their graphs, analytic geometry, polynomial equations, and linear system of equations will be covered. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science, or major requirements for the Schools of Management or Natural Sciences and Mathematics. Prerequisite: College Algebra or equivalent. (3-0) S

MATH 2333 Matrices, Vectors, and Their Application (3 semester hours) Matrices, vectors, determinants, inverses, systems of linear equations, and applications. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science, or major requirements in the School of Natural Sciences and Mathematics. Credit given for only one of MATH 2333 or 2418. Prerequisite: MATH 1314 or equivalent. (3-0) S

MATH 2417 (MATH 2417) Calculus I (4 semester hours) Functions, limits, continuity, differentiation; integration of function of one variable; logarithmic, exponential, and inverse trigonometric functions; techniques of integration, and applications. Three lecture hours and two discussion hours a week. Prerequisite: MATH 2312 or equivalent. (4-0) S

MATH 2418 Linear Algebra (4 semester hours) Systems of linear equations, determinants, vectors and vector spaces, linear transformations, eigenvalues and eigenvectors, quadratic forms. Three lecture hours and two discussion hours per week. Credit given for only one of MATH 2333 or 2418. Prerequisite: MATH 2419 or consent of instructor. (4-0) S

MATH 2419 Calculus II (MATH 2419) (4 semester hours) Continuation of MATH 2417. Improper integrals, sequences, infinite series, power series, parametric equations and polar coordinates, vectors, vector-valued functions, functions of several variables, partial derivatives and applications, multiple integration. Three lecture hours and two discussion hours a week. Prerequisite: MATH 2417. (4-0) S

MATH 2420 (MATH 2420) Differential Equations with Applications (4 semester hours) Topics covered will be drawn...
from the following list: First order differential equations, ordinary differential equations, system of linear differential equations, stability, series solutions, special functions, Sturm-Liouville problem, Laplace transforms and linear differential equations, numerical solutions and applications in physical sciences and engineering using computers. Three lecture hours and two discussion hours per week. Prerequisite: MATH 2419. (4-0) S

MATH 2421 Multivariable Calculus with Applications (4 semester hours) Vectors, matrices, vector functions, partial derivatives, divergence, curl, Laplacian, multiple integrals, line and surface integrals, Green's, Stoke's, and Gauss's theorems, and applications in physical sciences and engineering. Three lecture hours and two discussion hours per week. Prerequisite: MATH 2419. (4-0) S

MATH 2V90 Topics in Mathematics (1-6 semester hours) Special topics in mathematics outside the normal course of offerings. May be repeated for credit as topics vary (9 hours maximum). Consent of instructor required. ([1-6]-0) S

MATH 3303 Introduction to Mathematical Modeling (3 semester hours) An introduction to construction, use, and analysis of empirical and analytical mathematical models. Emphasis on using appropriate technology with tools such as curve fitting, probability and simulation, difference and differential equations, and dimensional analysis. Cannot be used to satisfy mathematics requirements by students in Mathematical Sciences and cannot be used to satisfy the advanced mathematics electives sequence by non-majors. Prerequisites: MATH 2419 and 2418. (3-0) Y

MATH 3310 Theoretical Concepts of Calculus (3 semester hours) Mathematical theory of calculus. Limits, types of convergence, power series, differentiation, and Riemann integration. Prerequisite: MATH 2419. (3-0) Y

MATH 3311 Abstract Algebra I (3 semester hours) Groups, rings, fields, vector spaces modules, linear transformations, and Galois theory. Prerequisite: MATH 2419. (3-0) Y

MATH 3312 Abstract Algebra II (3 semester hours) Continuation of Math 3311. Prerequisite: MATH 3311 (3-0) Y

MATH 3321 Geometry (3 semester hours) Elements of Euclidean, non-Euclidean, and projective geometry. Topics covered will be drawn from the following list: triangles and their distinguishing points, Euler line, nine point circle, extremum problems, circles and spheres, inversions, the circles of Apollonius, projective geometry, axioms of the projective plane, Desargues's theorem, conics, elementary facts of the non-Euclidean geometries. Prerequisite: MATH 2419. (3-0) Y

MATH 3379 Complex Variables (3 semester hours) Geometry and algebra of complex numbers, functions of a complex variable, power series, integration, calculus of residues, conformal mapping. Prerequisites: MATH 2421 and 3310. (3-0) Y

MATH 4301 Mathematical Analysis I (3 semester hours) Sets, real number system, metric spaces, real functions of several variables. Riemann-Stieltjes integration and other selected topics. Prerequisites: MATH 2421 and 3310. (3-0) Y

MATH 4302 Mathematical Analysis II (3 semester hours) Continuation of Math 4301. Prerequisite: MATH 4301. (3-0) Y

MATH 4332 Scientific Math Computing (3 semesters) Topics covered include introduction to Unix shells, basic and advanced use of Matlab for mathematical and scientific problem solving. Course is conducted in a computer classroom and assignments include applications in numerical and statistical analysis, image processing, and signal processing. Prerequisites: MATH 2418 and MATH 2419 or equivalent. (3-0) S

MATH 4334 Numerical Analysis (3 semester hours) Solution of linear equations, roots of polynomial equations, interpolation and approximation, numerical differentiation and integration, solution of ordinary differential equations; computer arithmetic and error analysis. Prerequisites: MATH 2418, 2421, and CS 1315 or equivalent knowledge of a high-level programming language. (Same as CS 4334.) (3-0) Y

MATH 4341 Topology (3 semester hours) Elements of general topology, topological spaces, continuous functions, connectedness, compactness, completeness, separation axioms, and metric spaces. Prerequisite: MATH 2421 or 3310. (3-0) Y

MATH 4355 Methods of Applied Mathematics (3 semester hours) Topics include some frequently used tools in applied mathematics: Laplace and Fourier transforms, special functions, systems, signals, and their applications in physical sciences and engineering. Prerequisites: MATH 2418 and 2420. (3-0) T

MATH 4362 Partial Differential Equations (3 semester hours) This course presents a survey of classical and numerical methods for the solution of linear and nonlinear boundary value problems governed by partial differential equations. Modeling and application-related issues are included throughout. Prerequisites: MATH 2420, 2421, and knowledge of a high-level programming language. (3-0) T

MATH 4398 Senior Honors in Mathematical Sciences (3 semester hours) For students conducting independent research for honors theses or projects. (3-0) S

MATH 4V03 Independent Study in Mathematics (1-6 semester hours) Independent study under a faculty member's
direction. Student must obtain approval from participating math sciences faculty member and the undergraduate advisor. ([1-6]-0) S

**MATH 4V91 Undergraduate Topics in Mathematics** (1-9 semester hours) Subject matter will vary from semester to semester. ([1-9]-0) S

**MATH 4V93 Undergraduate Topics in Applied Mathematics** (1-9 semester hours) Subject matter will vary from semester to semester. ([1-9]-0) S

**MATH 4V99 Undergraduate Research in Mathematical Sciences** (1-9 semester hours) Special undergraduate research project to be arranged with supervising professor. ([1-9]-0) S

**Statistics Course Descriptions**

**STAT 1342 (MATH 1342) Statistical Decision Making** (3 semester hours) Principles of quantitative decision making: summarizing data, modeling uncertainty, loss functions, probability, conditional probability, random variables. Introduction to statistics: estimation, confidence intervals, hypothesis testing, regression. Introduction to statistical packages. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science, or major requirements in the Schools of Management or Natural Sciences and Mathematics. Prerequisite: MATH 1300, MATH 1304, MATH 1314 or equivalent. (3-0) S

**STAT 2342 Statistics for the Sciences** (3 semester hours) Graphs, histograms, mean, median, standard deviation, Chebyshev's inequality, standardized scores, simple linear regression and correlation; basic rules of possibility, Bayes theorem, Normal; t, F, t, F, binomial and Poisson distributions; point estimation; hypothesis tests and confidence intervals for means, proportions regression coefficients, and correlation; one way ANOVA; Chi-square contingency tables. Applications in science will be emphasized throughout the course. Prerequisite: MATH 1325 or above. (3-0) Y

**STAT 3103 Statistical Computer Packages** (1 semester hour) An introduction to the use of statistics packages, such as SAS, BMD, SPSS, Minitab, and S, for the analysis of data. Based primarily on self-study materials. Cannot be used to satisfy degree requirements for mathematics majors. Prerequisite: one semester of statistics. (1-0) S

**STAT 3332 Statistics for Life Sciences** (3 semester hours) Graphs, histograms, mean, median, standard deviation, Chebyshev's inequality, standardized scores, simple linear regression and correlation; basic rules of possibility, Bayes theorem, Normal; t, F, binomial and Poisson distributions; point estimation; hypothesis tests and confidence intervals for means, proportions regression coefficients, and correlation; one way ANOVA; Chi-square contingency tables. Applications in life sciences will be emphasized throughout the course. Prerequisite: MATH 1325 or above. (3-0) Y

**STAT 3341 Probability and Statistics in Science and Engineering** (3 semester hours) Introduction to probability models and statistical data analysis, with emphasis on applications in the sciences and engineering. Cannot be used by mathematical sciences majors to satisfy degree requirements. Prerequisite: MATH 1326 or MATH 2419. (3-0) S

**STAT 3355 Data Analysis for Statisticians and Actuaries** (3 semester hours) Methods of data analysis used in different areas of Statistics and Actuarial Science. Sampling, fitting and testing models, regression, and comparison of populations. A statistical computer package will be used. Prerequisite: MATH 2419. (3-0) T

**STAT 3360 Probability and Statistics for Management and Economics** (3 semester hours) Probability theory including independence, conditioning, density functions, frequently used families of distributions, random variables, expectation, moments, and the central limit theorem; statistical inference including sampling, estimation, hypothesis testing, and regression. Cannot be used by mathematical sciences, engineering, or computer science majors to satisfy degree requirements. Prerequisite: MATH 1326. (3-0) S

**STAT 4332 Scientific Math Computing** (3 semester hours) Topics covered include introduction to Unix shells, basic and advanced use of Matlab for mathematical and scientific problem solving. Course is conducted in a computer classroom and assignments include applications in numerical and statistical analysis, image processing, and signal processing. Prerequisites: MATH 2418 and MATH 2419 or equivalent. (3-0) S

**STAT 4351 Probability** (3 semester hours) Probability models, random variables, expectation, special distributions, and the central limit theorem. The theory is illustrated by numerous examples. Prerequisite: MATH 2421. (3-0) T

**STAT 4352 Mathematical Statistics** (3 semester hours) Theory and methods of statistical inference. Sampling, estimation, hypothesis testing, analysis of variance, and regression with examples from the physical, social, and management sciences. Prerequisite: STAT 4351 or equivalent. (3-0) T

**STAT 4372 Actuarial Science** (3 semester hours) Probability models and statistical methods used in insurance business. Typical loss distributions including Pareto, Weibull, lognormal, loggamma, discrete and continuous mixtures. Effect of
coverage modifications, and clustering in modeling. Estimation by simulation. Prerequisite: STAT 4351. (3-0) T.

**STAT 4382 Stochastic Processes** (3 semester hours) Stochastic models including Markov chains, random walks, Poisson processes, renewal processes, and an introduction to time series and forecasting. Prerequisite: STAT 4351 or equivalent. (3-0) T

**STAT 4V02 Independent Study in Statistics** (1-6 semester hours) Independent study under a faculty member's direction. May be repeated for credit. Student must obtain approval from participating math sciences faculty member and the undergraduate adviser. ([1-6]-0) S

**STAT 4V97 Undergraduate Topics in Statistics** (1-9 semester hours) Subject matter will vary from semester to semester. May be repeated for credit (9 hours maximum). ([1-9]-0) S