MATH–Mathematics

MATH 0090 MATH STUDY SKILLS **1-0-1**
Strategies for learning mathematics, improving math study skills, and reducing math anxiety. Designed for students who have difficulty in basic mathematics and algebra.

MATH 0097 INTRODUCTORY ALEGBRA **3-0-3**
Prerequisite: placement according to COMPASS score
Real numbers, variable expressions, solving equations and inequalities, applications, graphing straight lines, polynomials, factoring, and radical expressions.

MATH 0099 INTERMEDIATE ALGEBRA **3-0-3**
Prerequisite: placement according to COMPASS score
Rational expressions, factoring, linear equations and inequalities, quadratic equations, word problems, graphs of linear functions, rational exponents, and radicals.

MATH 1001 QUANTITATIVE SKILLS AND REASONING **3-0-3**
Prerequisite: regular admission to the university or a passing grade on COMPASS.
Emphasis on processing information via models by conducting assumption validity, applicability and suitability checks, executing appropriate calculations to do forecasts and arrive at logical decisions. Will rely on examples to illustrate use of mathematics in real world situations. This course is an alternative in Area A of the Core Curriculum and is not intended to supply sufficient algebraic background for students who intend to take precalculus or the calculus sequences for mathematics and science majors. MATH 1001 serves as a prerequisite only for MATH 2200 and MATH 2900.

MATH 1101 MATHEMATICAL MODELLING **3-0-3**
Prerequisite: regular admission to the university or a passing grade on COMPASS
Placement recommendations: Some students who satisfy the prerequisites for MATH 1101 nonetheless need to reinforce their mathematical skills in a learning support mathematics course before taking MATH 1101. In particular, if any of the following is true, students should consider enrolling in MATH 0099: (a) the student did not complete two years of algebra and one year of geometry in high school; (b) the student has not completed a mathematics course in the past five years; (c) the student made below 430 on the mathematics portion of the SAT.
An introduction to mathematical modeling using graphical, numerical, symbolic, and verbal techniques to describe and explore real-world data and phenomena. Emphasis on the use of elementary functions to investigate and analyze applied problems and questions, supported by the use of appropriate technology, and on effective communication of quantitative concepts and results. MATH 1101 serves as a prerequisite only for MATH 2200 and MATH 2900.

MATH 1111 COLLEGE ALGEBRA **3-0-3**
Prerequisite: regular admission to the university or a passing grade on COMPASS
Placement recommendations: Some students who satisfy the prerequisites for MATH 1111 nonetheless need to reinforce their mathematical skills in a learning support mathematics course before taking MATH 1111. In particular, if any of the following is true, students should consider enrolling in MATH 0099: (a) the student did not complete two years of algebra and one year of geometry in high school; (b) the student has not completed a mathematics course in the past five years; (c) the student made below 430 on the mathematics portion of the SAT.
Functional approach to algebra that incorporates the use of appropriate technology. Emphasis will be placed on the study of functions and their graphs, inequalities, and linear, quadratic, rational, polynomial, exponential, and logarithmic functions. Appropriate applications will be included.

MATH 1113 PRE-CALCULUS MATHEMATICS **3-0-3**
Prerequisite: MATH 1111 or a grade of at least 550 on the mathematics portion of the SAT
Designed to prepare students for calculus, physics, and related technical subjects. Topics include an intensive study of algebraic, trigonometric, logarithmic and exponential functions accompanied by analytic geometry.

MATH 1161 CALCULUS I **4-0-4**
Prerequisite: MATH 1113 or a grade of at least 600 on the mathematics portion of the SAT
Functions and limits; the derivative and its applications, antidifferentiation; the definite integral and applications; exponential and logarithmic functions.

MATH 1161H HONORS CALCULUS I **4-0-4**
Prerequisite: MATH 1113 or 600 or higher on the mathematics portion of the SAT. Admission to the Honors Program or a minimum grade of B in MATH 1113, or permission of the department head.
Course content similar to MATH 1161, but a more rigorous treatment of differential and integral calculus. Course will include oral or written student presentations of theoretical or applied projects.

MATH 1950 APPLIED MATH FOR NON-SCIENCE MAJORS **3-0-3**
Prerequisite: MATH 1111
Mathematical applications in economics and the social sciences. Linear functions and models; matrix operations and applications; inequalities and linear programming; exponential functions and log functions; single and multivariate differentiation.

MATH 2072 CALCULUS II **4-0-4**
Prerequisite: MATH 1161
Techniques and applications of integration; transcendental functions; indeterminate forms; improper integrals; parametric equations and polar coordinates; sequences and series; Taylor's theorem.

MATH 2083 CALCULUS III **4-0-4**
Prerequisite: MATH 2072
Vectors, curves, and surfaces; partial differentiation; multiple integrals; curve integrals and surface integrals; the theorems of Green and Stokes; the Divergence Theorem; introduction to differential equations.

MATH 2160 LINEAR ALGEBRA **3-0-3**
Prerequisite: MATH 2072
Linear systems and matrices; vector spaces, linear independence, rank of a matrix; linear transformations; determinants; introduction to eigenvalues and eigenvectors; diagonalization; applications.

MATH 2200 ELEMENTARY STATISTICS **3-0-3**
Prerequisite: MATH 1001 or MATH 1101 or MATH 1111
Measures of central tendency and dispersion; probability distributions; inferences concerning means and proportions; goodness of fit; correlation; linear regression.

MATH 2900 SPIRIT AND STRUCTURE OF MATHEMATICS **3-0-3**
Prerequisite: MATH 1001 or MATH 1101 or MATH 1111
Designed to portray the history, philosophy, and aesthetics of mathematics, and to develop an appreciation of the role of mathematics. Topics include logic, set theory, problem solving, number systems, statistics, probability, geometry.

MATH 3000 INTRODUCTION TO MATHEMATICAL PROOF **3-0-3**
Prerequisite: MATH 2072
Elementary logic, set theory, functions and relations, methods of proof including induction, and selected topics from major areas of mathematics.

MATH 3110 ABSTRACT ALGEBRA **3-0-3**
Prerequisite: MATH 2083 and MATH 3000
Elementary properties of integers, groups, rings, and fields; mappings, homomorphisms, kernels, quotient structures.

MATH 3170 ADVANCED LINEAR ALGEBRA **3-0-3**
Prerequisite: MATH 2160 and MATH 3000
Abstract vector spaces, linear transformations, eigenvectors and eigenvalues, diagonalization, inner product spaces, real quadratic forms.

MATH 3201 COMPUTATIONAL METHODS IN STATISTICS **3-0-3**
Prerequisite: MATH 2200 and either CSCI 1050 or CSCI 1060
Data analyses including topics from elementary statistics as well as ANOVA, multiple regression and nonparametric statistics using statistical software packages such as Minitab, SAS, or SPSS.

MATH 3251 PROBABILITY AND COMBINATORICS **3-0-3**
Corequisite: MATH 3211
Permutations and combinations; binomial coefficients; distributions of random variables; independence and conditional probability; distributions of functions of random variables such as expectation, variance and moment-generating functions; Central Limit Theorem; estimation; tests of statistical hypotheses; conditional and marginal distributions; multivariate distributions.

MATH 3360 MODERN GEOMETRY **3-0-3**
Prerequisite: MATH 3000
An axiomatic approach to the fundamental ideas of Euclidean geometry, including congruence, similarities, circles, elementary transformations and constructions. Examination of non-Euclidean geometries.

MATH 3411 DIFFERENTIAL EQUATIONS **3-0-3**
Prerequisite: MATH 2072
First order linear and nonlinear equations; second and higher order linear equations; applications; the Laplace transform; numerical solution with emphasis on computer-aided solution.

MATH 3422 DIFFERENTIAL EQUATIONS II **3-0-3**
Prerequisite: MATH 3411
Series solutions; linear and nonlinear first order systems; applications; numerical methods; boundary value problems; introduction to Fourier series and partial differential equations.

MATH 3460 INTRODUCTION TO OPERATIONS RESEARCH **3-0-3**
Corequisite: MATH 2160 and MATH 3211
Topics in operations research selected from linear programming, project management, decision analysis, queueing theory, simulation, dynamic programming, scheduling theory.

MATH 3480 OPTIMIZATION AND GRAPH THEORY **3-0-3**
Corequisite: MATH 2160 and MATH 3211
Topics in operations research selected from nonlinear programming, network analysis, Markhov chains, game theory, inventory theory.

MATH 3900 SPECIAL TOPICS IN APPLIED MATHEMATICS **V-V-(1-3)**
Prerequisite: announced with the course
Special topics of current interest in upper-level applied mathematics.

MATH 3911 ALGORITHMS AND NUMBER SYSTEMS: A LABORATORY APPROACH **2-3-3**
Prerequisite: either MATH 1161 or MATH 2900 and a passing grade on Praxis I
A laboratory approach to the study of mathematics. Topics include problem solving; sets; functions; numeration systems; and the integer, rational, and real number systems.

MATH 3912 GEOMETRY AND DATA ANALYSIS: A LABORATORY APPROACH **2-3-3**
Prerequisite: MATH 3911 and admission to teacher education
A laboratory approach to the study of mathematics. Topics include geometry, measurement, probability, statistics, and motion geometry.

MATH 3932 MATHEMATICAL REASONING AND REPRESENTATION **2-3-3**
Prerequisite: MATH 1113 and MATH 3912
A laboratory approach to the study of mathematics. Topics include methods of reasoning and proof; algebraic structures; conceptual consideration of functions; regression; recursion; propor-tional reasoning; analytic and transformational geometry; and rational, integer and real number arithmetic.

MATH 4000 PUTNAM SEMINAR **0-2-1**
Prerequisite: MATH 2083
A variety of mathematical problems, considered with the aim of developing problem-solving techniques.

MATH 4011 ADVANCED CALCULUS I **3-0-3**
Prerequisite: MATH 2083 and MATH 3000
The real number system; sequences and series; limits of functions, the Bolzano-Weierstrass theorem; uniform continuity; the derivative.

MATH 4022 ADVANCED CALCULUS II **3-0-3**
Prerequisite: MATH 4011
The Riemann integral; metric spaces; compactness; sequences of functions; uniform convergence.

MATH 4060 FUNCTIONS OF COMPLEX VARIABLES **3-0-3**
Prerequisite: MATH 2083
Complex numbers; elementary functions and transformations; differentiation; analytic functions; integration theory; series; residue theory; conformal mapping and applications.

MATH 4200 ACTUARIAL SCIENCE SEMINAR **(1-3)-0-(1-3)**
Prerequisite: MATH 3222
Study of topics related to a career in actuarial science.

MATH 4360 TOPOLOGY **3-0-3**
Prerequisite: MATH 2083 and MATH 3000
Topological spaces and homeomorphisms, separability, compactness, connectedness; completeness; metrizability; introduction to homotopy theory.

MATH 4400 OPERATIONS RESEARCH SEMINAR **(1-3)-0-(1-3)**
Prerequisite: MATH 3460
Study of topics related to a career in operations research.

MATH 4610 NUMERICAL ANALYSIS **3-0-3**
Prerequisite: MATH 2072 and CSCI 1301
An introductory course in numerical analysis and computation. Topics include computer arithmetic and numerical error, systems of linear equations, iterative methods for nonlinear equations, polynomial interpolation, least squares approximation, and numerical integration. Crosslisted as CSCI 5610U.

MATH 4900 SPECIAL TOPICS **V-V-(1-3)**
Prerequisite: announced with the topic
Special topics of current interest in upper-level mathematics.

MATH 4910 HONORS PROJECT IN MATHEMATICS **(1-3)-0-(1-3)**
Prerequisite: permission of instructor
Open only to seniors. Independent reading or research in the mathematical sciences, including a presentation to an appropriate audience.

MATH 4961, -2, -3 INTERNSHIP IN MATHEMATICS **0-6-3**
Prerequisite: permission of instructor or department
Experience in a variety of mathematical applications suited to the educational and professional aspirations of the student, under the direction of faculty and appropriate off-campus supervisory personnel. Open to transient students only with the permission of the department head.

MATH 4964 PRACTICUM IN TEACHING MATHEMATICS **V-V-(1-3)**
Prerequisite: permission of instructor or department head
Students assigned to classroom teachers in grades 7-12 or special teaching/practicum assignments under the supervision of a teacher. May include Saturday school, summer school, Project PREP, assigned tutorials. Grading is S/U, with one semester hour of credit equivalent to 60 practicum hours. Repeatable to a total of three credit hours.

MATH 5160U THEORY OF NUMBERS **3-0-3**
Prerequisite: MATH 3000
A survey of topics from number theory to include divisibility and congruence, diophantine equations, distribution of prime numbers, famous unsolved problems, number-theoretic functions and their applications, theorems of Fermat and Euler.

MATH 5600U FOUNDATIONS OF MATHEMATICS **3-0-3**
Prerequisite: MATH 2072
Fundamental ideas of axiomatic mathematics, including sets, relations, functions, algebraic structures, with emphasis on techniques of writing proofs.

MATH 5700U HISTORY OF MATHEMATICS **3-0-3**
Prerequisite: MATH 3000
The historical development of mathematics from its empirical beginnings to its present state.

MATH 5900U TOPICS IN MATHEMATICS **V-V-(1-3)**
Prerequisite: permission of instructor or department
Special topics of current interest in upper-level mathematics.

MATH 5911U TOPICS IN MATHEMATICS FOR EDUCATORS **3-0-3**
Prerequisite: MATH 3911
Topics in mathematics designed for preservice and inservice elementary and middle grades teachers.

STAT – Statistics

STAT 3211 - PROBABILITY AND STATISTICS APPLICATIONS I **3-0-3**
Prerequisite: MATH 2072
Data collection, organization and description; probability, random variables; discrete and continuous probability distributions; Central Limit Theorem; point and interval estimation; tests of hypotheses; simple linear regression and correlation.

STAT 3222 - PROBABILITY AND STATISTICS APPLICATIONS II **3-0-3**
Prerequisite: STAT 3211 and MATH 2160
Sampling techniques, multiple linear regression, nonparametric statistics, and MANOVA.

STAT 3231 - MATHEMATICAL STATISTICS I **3-0-3**
Prerequisite: MATH 2083
Probability, properties of discrete and random variables, joint and conditional distributions, expectation, and transformations.

STAT 3232 - MATHEMATICAL STATISTICS II **3-0-3**
Prerequisite: STAT 3231
Central limit theorem, point and interval estimation, sampling distributions, sufficient statistics, and hypothesis testing.

STAT 3240 - EXPERIMENTAL DESIGN **3-0-3**
Prerequisite: STAT 3211 or STAT 3231
Completely randomized and randomized block designs, incomplete block designs, fixed, random and mixed effects models, split-plot designs, nested experiments, analysis of covariance, and factorial experiments.