

Description of Courses

MATH 100. Introduction to Mathematical Thinking (1). This course aims to give non-mathematics majors a sense of the importance of mathematics in human thought and an appreciation of the beauty and vitality of present-day mathematics. Material varies. Sample topics include combinatorial puzzles, number theory, tilings, networks, symmetries, map coloring, knots and surfaces, alternative number systems, and infinite sets. (1S) *Offered occasionally. Prerequisite: not open to students who have taken a mathematics course numbered 110 or higher or who have Advanced Placement credit for calculus.*

MATH 103. Cultural Approaches to Mathematics (1). What we think of as “mathematical” ideas may be viewed by other cultures within the contexts of art, navigation, religion, record-keeping, games, or kin relationships. This course treats mathematical ideas investigated by cultures such as North and South American Indians, Africans, and various peoples of the Pacific Islands, and analyzes them through Western mathematics (developed in Europe, the Middle East, and India). The course helps the student understand what mathematics is, both to Western culture and to other cultures, and how cultural factors influenced the development of modern mathematics. (Also listed as Interdisciplinary Studies 103.) (5T) *Offered each semester.*

MATH 104. Finite Mathematics (1). An introduction to finite methods in mathematics: probability, graphs, linear programming, game theory, and patterns. The course emphasizes ways in which these methods can be used to build mathematical models applicable to the social and biological sciences. *Offered occasionally. Prerequisite: 3 years of high school mathematics.*

MATH 106. Introduction to Statistical Concepts (1). Introductory probability and statistics with illustrations from the behavioral, social, and natural sciences. Descriptive statistics, elementary probability, hypothesis testing, analysis of variance, contingency tables, linear regression and correlation, nonparametric tests. *Offered each semester. Prerequisite: facility in high school algebra. Not open to students who have completed or are taking Mathematics 205, Anthropology 240, or Psychology 150.*

MATH 110. Calculus I (1). An introduction to differential and integral calculus. Limits and continuity, derivatives and integrals of polynomial, trigonometric, exponential, and logarithmic functions, applications of derivatives to optimization and approximation, the Mean Value Theorem, and the Fundamental Theorem of Calculus. (1S) *Offered each semester. Prerequisite: four years of high school mathematics, including trigonometry and either college algebra or precalculus.*

MATH 115. Calculus II (1). Techniques of integration, L'Hôpital's Rule, infinite sequences and series, Taylor series and applications, first-order differential equations, and introduction to the calculus of multivariable functions, including partial derivatives and multiple integrals. (1S) *Offered each semester. Prerequisite: Mathematics 110.*

MATH 117. Calculus Colloquium (1/4). Presentations by faculty, participants, and occasional guest speakers on a variety of topics related to calculus and its applications to other disciplines. *Graded credit/no credit. Offered each fall. Prerequisite: concurrent enrollment in a mathematics course numbered 110 or higher or Advanced Placement credit for calculus.*

MATH 160. Discrete Structures (1). Introduction to the mathematical basis for computer science, including logic, counting, graphs and trees, and discrete probability. *Offered even years, fall semester. Prerequisite: Computer Science 121 and Mathematics 110.*

MATH 175. Linear Algebra (1). Linear equations and matrices, abstract vector spaces and linear transformations, orthogonality, eigenvalues and eigenvectors. Emphasizes development of abstract thinking and a variety of applications of linear algebra in science and social science. (1S) *Offered each semester. Prerequisite: Mathematics 115; some computer programming experience is desirable.*

MATH 190. Differential Equations (1). Solution methods for first-order differential equations, linear differential equations, power-series solutions, the Laplace transform, numerical methods, stability, applications. *Offered odd years, spring semester. Prerequisite: Mathematics 115.*

MATH 200. Combinatorics and Graph Theory (1). Combinatorial counting principles, generating

functions and recurrence relations, introduction to graph theory, graph-theoretic algorithms, and their implementation. Applications to operations research, computer science, and social science.

Offered odd years, fall semester. Prerequisite: Mathematics 115; Computer Science 121 and 123, or equivalent.

MATH 201. Vector Calculus (1). Differentiation and integration of functions of several variables; integration on surfaces; vector analysis; theorems of Green, Stokes, and Gauss; applications to ordinary and partial differential equations and to geometry. *Offered even years, spring semester.*

Prerequisite: Mathematics 115.

MATH 205. Mathematical Statistics I (1).

Probability calculus for discrete and continuous probability distributions of one and several variables, including order statistics, combining and transforming random variables, and the use of moment-generating functions. Introduction to hypothesis testing. *Offered even years, fall semester.*

Prerequisite: Mathematics 115.

MATH 208. Chaotic Dynamical Systems (1).

An introduction to the mathematical theory of dynamical systems, with special attention to systems exhibiting chaotic behavior. One-dimensional dynamics: fixed points, periodic orbits, chaotic orbits, and the transition to chaos. Two-dimensional dynamics: fractal images, Julia sets, and the Mandelbrot set. Includes computer experiments with chaotic systems; applications.

Offered odd years, spring semester. Prerequisite:

Mathematics 115.

MATH 215. Abstract Algebra (1). Axiomatic treatment of selected algebraic structures including groups, rings, integral domains, and fields, with illustrative examples. Also includes elementary factorization theory. *Offered each spring. Prerequisite:*

Mathematics 175.

MATH 230. Topics in Geometry (1). Topics chosen to illustrate modern approaches to geometry. May be repeated for credit if topic is different, with the approval of the department.

Offered occasionally. Prerequisite: Mathematics 175, or other courses depending on the topic.

MATH 240. Real Analysis (1). The real numbers, metric concepts and continuity, differentiation and integration of real functions,

infinite sequences and series of functions. *Offered each fall. Prerequisite: Mathematics 175 or 208.*

MATH 270. Topics in Mathematics (1/4 - 1).

Selected aspects of mathematics reflecting the interests and experience of the instructor. May be repeated for credit if topic is different. *Offered occasionally. Prerequisite: varies with topic.*

MATH 300. Mathematical Modeling (1).

Construction and investigation of mathematical models of real-world phenomena, including team projects and use of computer packages as needed. *Offered odd years, fall semester. Prerequisite: 1 unit of computer science and 2 mathematics courses numbered 175 or higher.*

MATH 310. Mathematical Statistics II (1).

Properties of point estimators, development of hypothesis tests by means of the generalized likelihood ratio, and inference using the normal and related distributions. One- and two-sample, goodness of fit, and distribution-free hypothesis tests. Inference for regression and analysis of variance. *Offered odd years, spring semester. Prerequisite: Mathematics 205.*

MATH 335. Topology (1). Topological invariants of knots, classification of compact surfaces, structure of three-dimensional manifolds.

Introduction to homotopy groups and abstract topological spaces. *Offered odd years, spring semester. Prerequisite: Mathematics 175 or 208.*

MATH 375. Complex Analysis (1). The complex plane, analytic functions, complex integration, Taylor and Laurent series, residues and poles, conformal mapping, applications.

Offered even years, spring semester. Prerequisite: Mathematics 201 or 240.

MATH 380. Topics in Mathematics (1/4 - 1).

Selected topics in mathematics, reflecting the interests and experience of the instructor. May be repeated for credit if topic is different. *Offered occasionally. Prerequisite: varies with topic.*

MATH 383. Mathematics Colloquium (1/4).

Presentations by participants and faculty on selected topics, with occasional guest speakers. This version of the colloquium is especially recommended for mathematics minors. May be

taken two times for credit if topic is different.
Graded credit/no credit. Prerequisite: Mathematics 175.

MATH 384. Mathematics Colloquium (1/2).

Students learn how to research topics, write papers, and present talks in mathematics. They review manuscripts and talks given by students in Mathematics 385 and write preliminary drafts of presentations themselves. Discussions on other topics of significance to mathematics professionals. *Offered each semester. Prerequisite: Mathematics 175.*

MATH 385. Mathematics Colloquium (1/4).

Presentations and written papers by the participants on selected topics, with occasional guest speakers. The course may be taken more than once. *Offered each semester. Prerequisite: Mathematics 384, junior standing.*

MATH 390. Special Projects (1/4 - 1).

Individual guided investigations of topics or problems in mathematics. Since such investigation is important to the development of mathematical maturity, the department encourages each major to do at least one such project. *Prerequisite: approval of the project by the department chair. Sophomore standing.*

MATH 395. Teaching Assistant (1/2). Work with faculty in classroom instruction. *Graded credit/no credit.*

MATH 396. Teaching Assistant Research (1/2).

Course and curriculum development projects with faculty.