Mathematics

**MATH 75B. Calculus
with Review IB (4)**
Prerequisite: MATH 75A. Further applications of derivatives and definite and indefinite integrals, with extensive review of algebra and elementary functions. With MATH 75A, equivalent to MATH 75. **FS**

MATH 76. Calculus II (4)
Prerequisite: MATH 75 or 75A and B. Techniques and applications of integration, improper integrals, conic sections, polar coordinates, infinite series. **FS**

MATH 77. Calculus III (4)
Prerequisite: MATH 76. Vectors, three-dimensional calculus, partial derivatives, multiple integrals, Green's Theorem, Stokes' Theorem. **FS**

MATH 81. Applied Analysis (3)
Prerequisite: MATH 77. Introduction to ordinary linear differential equations and linear systems of differential equations; solutions by Laplace transforms. Solution of linear systems of equations; introduction to vector spaces; eigenvalues and eigenvectors. Using computer software as an exploratory tool. **FS**

**MATH 90. Directed Study
(1-3; max total 3)**
Independently arranged course of study in some limited area of mathematics either to remove a deficiency or to investigate a topic in more depth. (1-3 hours, to be arranged)

MATH 100. Exploring Mathematics (3)
Prerequisite: MATH 10B. A problem-solving approach to topics from game theory, combinatorics, mathematical modeling, and finite geometries. **FS**

MATH 101. Statistical Methods (4)
Prerequisite: MATH 70 or 75 or 75A and B; no credit if taken after MATH 108. Application of statistical procedures to examples from biology, engineering, and social science; one- and two-sample normal theory methods; chi-square, analysis of variance, and regression; nonparametric methods. Computerized statistical packages are used. **FS**

**MATH 107. Introduction to
Probability and Statistics (3)**
Prerequisite: MATH 77 (may be taken concurrently). Basic concepts required for applications of probability theory; standard discrete and continuous models; random variables; conditional distributions; limit theorems. **F**

MATH 108. Statistics (3)
Prerequisite: MATH 107. Criteria used for selecting particular procedures of data analysis; derivation of commonly used procedures; topics from sampling, normal theory, nonparametrics, elementary decision theory. **S even**

MATH 109. Applied Probability (3)
Prerequisite: MATH 107. Introduction to stochastic processes and their applications in science and industry. Markov chains, queues, stationary time series. **S odd**

MATH 110. Symbolic Logic (3)
(Similar to PHIL 145; consult department.) Prerequisite: MATH 75 or 75A and B. An informal treatment of the theory of logical inference, statement calculus, truth-tables, predicate calculus, interpretations applications. **S**

**MATH 111. Transition to Advanced
Mathematics (3)**
Prerequisite: MATH 76. Introduction to the language and problems of mathematics. Topics include set theory, symbolic logic, types of proofs, and mathematical induction. Special emphasis is given to improving the student's ability to construct, explain, and justify mathematical arguments. **FS**

MATH 114. Discrete Structures (3)
Prerequisite: MATH 111. Counting techniques, matrix algebra, graphs, trees and networks, recurrence relations and generating functions, applied modern algebra. **F**

MATH 116. Theory of Numbers (4)
Prerequisite: MATH 111. Divisibility theory in the integers, primes and their distribution, congruence theory, Diophantine equations, number theoretic functions, primitive roots, indices, the quadratic reciprocity law. **FS**

MATH 118. Graph Theory (3)
Prerequisite: MATH 111. Trees, connectivity, Euler and Hamilton paths, matchings, chromatic problems, planar graphs, independence, directed graphs, networks. **S even**

MATH 121. Numerical Analysis I (3)
Prerequisites: MATH 77 and CSCI 40. Zeros of nonlinear equations, interpolation, quadrature, systems of equations, numerical ordinary differential equations, and eigenvalues. Use of numerical software libraries. **S**

**MATH 123. Topics in Applied
Mathematics (3)**
Prerequisite: MATH 77. Vector spaces and linear transformations, eigenvalues and eigen functions. Special types of linear and nonlinear differential equations; solution by series. Fourier transforms. Special functions, including gamma, hypergeometric, Legendre, Bessel, Laguerre, and Hermite functions. Introduction to partial differential equations. **S odd**

**MATH 128. Applied Complex
Analysis (3)**
Prerequisite: MATH 77. Analytic functions of a complex variable, contour integration, series, singularities of analytic functions, the residue theorems, conformal mappings; emphasis on engineering and physics applications. **F**

**MATH 133. Number Theory
for Liberal Studies (3)**
Prerequisite: MATH 10B or permission of instructor. The historical development of the concept of number and arithmetic algorithms. The magnitude of numbers. Basic number theory. Special numbers and sequences. Number patterns. Modular arithmetic. **F**

**MATH 134. Geometry for
Liberal Studies (3)**
Prerequisite: MATH 10B or permission of instructor. The use of computer technology to study and explore concepts in Euclidean geometry. Topics include, but are not restricted to, properties of polygons, tilings, and polyhedra. **S**

MATH 137. Exploring Statistics (3)
Prerequisite: MATH 10B or permission of instructor. Descriptive and inferential statistics with a focus on applications to mathematics education. Use of technology and activities for student discovery and understanding of data organization, collection, analysis, and inference. **F**

MATH 138. Exploring Algebra (3)
Prerequisite: MATH 10B or permission of instructor. Designed for prospective school teachers who wish to develop a deeper conceptual understanding of algebraic themes and ideas needed to become competent and effective mathematics teachers. **S**

MATH 143. History of Mathematics (4)
Prerequisite: MATH 75 or 75A and B. History of the development of mathematical concepts in algebra, geometry, number theory, analytical geometry, and calculus

Science and Mathematics