Mathematics

MATH S-1a Section 1. Calculus I (CRN: 30391)
Otto K. Bretscher PhD, Assistant Professor of Mathematics, Colby College

This course will cover differential and integral calculus in one variable, with applications. We aim to develop conceptual understanding, computational skills, and the students' ability to apply the material to science. The topics covered overlap with the AP calculus curriculum to a large extent. A graphing calculator can occasionally be useful.

MATH S-1a Section 2. Calculus I (CRN: 30392)
Otto K. Bretscher PhD, Assistant Professor of Mathematics, Colby College

This course will cover differential and integral calculus in one variable, with applications. We aim to develop conceptual understanding, computational skills, and the students' ability to apply the material to science. The topics covered overlap with the AP calculus curriculum to a large extent. A graphing calculator can occasionally be useful.

MATH S-1ab. Calculus I and II (CRN: 30390)
Robin Gottlieb MSc, Senior Preceptor in Mathematics, Harvard University
John Mackey PhD, Preceptor in Mathematics, Harvard University

The course covers differential and integral calculus in one variable, including limits and some differential equations. We aim to develop theoretical understanding and practical skills. Graphing calculators help with understanding certain concepts and are recommended. The topics covered are not identical to those of a BC advanced placement class, but do overlap with the AP calculus curriculum to a large extent.

MATH S-1b. Calculus II (CRN: 30393)
Robin Gottlieb MSc, Senior Preceptor in Mathematics, Harvard University

Galileo wrote that "the book of the universe is written in the language of mathematics." Speaking the language of modern mathematics requires fluency with the topics of this course: infinite series, integration, and differential equations. We aim to balance applications and theoretical understanding. Graphing calculators can help with understanding certain concepts and are recommended, but examinations will not require them. The topics covered are not identical to those of a BC Advanced Placement class, but do overlap with the AP calculus curriculum to a large extent.

MATH S-Qr. Chance: An Introduction to Quantitative Reasoning in Everyday Life (CRN: 31523)
John Mackey PhD, Preceptor in Mathematics, Harvard University

This is a beginning probability and statistics course that introduces notions of mean, median, variance, and randomness through contemporary examples. Current news topics provide material for relevant and lively class discussions. Whether you know just a little arithmetic or a lot, this is an engaging course about the use and misuse of quantitative reasoning in everyday life.

MATH S-104. Discrete Mathematics with Computer Science Applications (CRN: 31643)
William B. Robinson PhD, Lecturer in Extension, Harvard University

An introduction to topics in discrete mathematics that are useful in computer science: mathematical logic, set theory, induction, recursion, combinatorics, relations and functions, and graphs. Includes an introduction to algorithm analysis and techniques for proving correctness of programs. Practical programming examples, as well as proof of relevant theorems, will be discussed. The course is intended both for beginning students of computer science and for computer professionals.

MATH S-Xab. Introduction to Functions and Calculus (CRN: 31530)

Thomas W. Judson PhD, Preceptor in Mathematics, Harvard University

This course focuses on functions and their rates of change as these ideas appear in precalculus, differential calculus, and integral calculus. We emphasize the relations among symbolic, numerical, and graphical points of view throughout. Calculus techniques are motivated and illustrated by modeling problems in economics, biology, and other applications.

MATH S-21b. Linear Algebra and Differential Equations (CRN: 30190)

Robert Winters PhD, Visiting Professor of Mathematics, Wellesley College

Topics to be covered include Gauss's method for solving systems of linear equations; matrices; determinants; vector spaces; linear transformations, eigenvalues, and eigenvectors; modeling by differential equations; graphical and numerical analysis of first order equations; first order systems of differential equations; phase plane analysis of systems; applications to population dynamics of biological organisms and mechanical vibrations.

MATH S-21a. Multivariable Calculus (CRN: 30189)

Oliver Knill PhD, Preceptor in Mathematics, Harvard University

To see how calculus applies in situations described by more than one variable, we study vectors, lines, planes, parameterization of curves and surfaces; partial derivatives, directional derivatives, and gradients; optimization and critical point analysis, including the method of Lagrange multipliers; integration over curves, surfaces, and solid regions using Cartesian, polar, cylindrical, and spherical coordinates; vector fields, line and surface integrals for work and flux; and the divergence and curl of vector fields together with applications.

MATH S-Ar Section 1. Precalculus Mathematics (CRN: 30388)

Daniel L. Goroff PhD, Professor of the Practice of Mathematics, Harvard University

A review of algebra is integrated into the study of rational, exponential, logarithmic, and trigonometric functions. Taught in small sections, the course emphasizes applications and problem solving and provides preparation for calculus and basic science. Graphing calculators will be used, though no previous calculator experience is required.

MATH S-Ar Section 2. Precalculus Mathematics (CRN: 30389)

Daniel L. Goroff PhD, Professor of the Practice of Mathematics, Harvard University

A review of algebra is integrated into the study of rational, exponential, logarithmic, and trigonometric functions. Taught in small sections, the course emphasizes applications and problem solving and provides preparation for calculus and basic science. Graphing calculators will be used, though no previous calculator experience is required.

MATH S-301. Theory and Practice of Teaching Number Theory (CRN: 31668)

John D. Boller PhD, Preceptor in Mathematics, Harvard University
Andy Engelward PhD, Preceptor in Mathematics, Harvard University

Topics include: rules of arithmetic, the ring of integers, order axioms and well-ordering of the natural numbers, the division algorithm and Euclidean algorithm, primes and divisibility, congruence and modular arithmetic. Additional topics may include: palindromes, Fibonacci numbers, combinatorial formulas, four numbers game, Egyptian fractions.