BOSTON UNIVERSITY

Topics List for Calculus:

Calculus I (CAS MA 123)
Calculus II (CAS MA 124)
Multivariate Calculus (CAS MA 225)

All entering students must assess their readiness for Calculus. Boston University will be concerned with your mastery of material, not just your score on an exam. Please review this topics list to assist in your assessment of Calculus material. You will consult a faculty advisor before finalizing your registration.

Text Used: J. Stewart, Calculus: Concepts and Contexts, 3rd Ed.

CAS, MA 123, Calculus 1

Review of Pre-Calculus topics (a day or two)

Limits and Continuity: limit laws, continuous functions, limits involving infinity

Tangent lines and rates of change

Derivative and its meaning

Differentiation Rules: Linearity, Product rule, Quotient rule, Chain rule

Other examples of derivatives: trigonometric functions, inverse functions, implicit derivatives, logarithmic differentiation

Applications of differentiation: related rates, max/min problems, derivatives and shapes of curves

Fundamental Theorem of Calculus, techniques of integration: "u" –substitution method.

CAS, MA 124, Calculus 1I

Review of Calculus 1: Fundamental Theorem of Calculus

Techniques of integration: "u"-substitution , integration by parts

Other techniques: Emphasis is on general patterns. Might include partial fractions or work with computer algebra systems.

Other integration topics: numerical integration, integration with CAS, improper integrals

Applications of integration: volumes (revolution), arc length (emphasis on ideas involved in developing the formulas), Average value, other applications including probability

Sequences and Series: limits of sequences, series, convergence tests for series, integral, comparison, ratio test, power series

Taylor Polynomials and Series: Taylor's Inequality

Differential Equations (brief overview)

CAS, MA 225, Multivariate Calculus

This course follows Calculus II and assumes students have mastered and remember their Calculus I and II material. The tools of Calculus are extended to include functions with domain and/or range of 2 and 3 variables.

Vector Algebra and Geometry: coordinates and vectors in 2 and 3 dimensions, dot and cross product, linear equations, polar/spherical coordinates

Vector functions (space curves): derivatives/velocity and acceleration, curvature

Functions of Several Variables: limits and continuity, partial derivatives, tangent planes and linear approximation

Applications: max/min, Lagrange multipliers, directional derivatives and gradient.

Multiple integrals: double and triple integrals over arbitrary regions, computations in polar coordinates

Vector Calculus: vector fields, divergence and curl, surface integrals, Green's, Stokes, Divergence Theorems