MATHEMATICS 151A
ADVANCED CALCULUS I


This is the first course in a three quarter sequence giving a rigorous development of mathematical analysis. Topics covered in the sequence include the real and complex number systems, sequences and series, continuity, differentiation, the Riemann-Stieltjes integral, sequences and series of functions, functions of several variables, and an introduction to Lebesgue integration.

TOPICS

The real and complex number systems ........................................ 4
(Ch. 1)

- Axiomatic description of the real number system, the extended real numbers, the complex numbers, Euclidean spaces.

Point set theory in Euclidean spaces ......................................... 4
(Ch. 2)

- Finite, countable and uncountable sets, metric spaces, compact sets, perfect sets, connected sets.

Numerical sequences and series .................................................. 5
(Ch. 3)

- Convergent sequences, subsequences, Cauchy sequences, important examples, series of negative terms, tests for convergence, absolute convergence, addition and multiplication of series, rearrangements.

Continuity ................................................................. 3
(Ch. 4)

- Limits of functions, continuity, continuous functions on compact sets, continuous functions on connected sets, discontinuities, monotonic functions, infinite limits and limits at infinity.

Differentiation ............................................................. 3
(Ch. 5)

- The derivative, the Mean Value Theorem, continuity of derivatives, L'Hospital's Rule, higher order derivatives, Taylor's Theorem, vector valued functions.

The Riemann-Stieltjes integral .................................................. 4
(Ch. 6)

- Definition of the integral, conditions guaranteeing existence, properties of the integral, integration and differentiation, vector valued functions, rectifiable curves.