MATHEMATICS 144

INTRODUCTION TO SET THEORY

TEXTS: *Naïve Set Theory*, by P. Halmos (H), *Essays on the Theory of Numbers,* by R. Dedekind (Dover Edition)

Topics covered include the basic language of set theory, cardinal and ordinal numbers and their arithmetic operations, the well ordering principle, transfinite induction and Zorn's Lemma.

TOPICS	SUGGESTED NO. OF 50 MIN. CLASSES

The algebra of set theory……..……5
(H §§ 1-5)

Equality of sets, specification principle for defining sets, unions, intersections, complements and powers.

Binary relations and functions…….5
(H §§ 6-10)

Cartesian products, relations, functions, indexed families, operations on functions.

The natural numbers……..4
(H §§ 11-14, Dedekind)

Ordering relations, the Peano axioms for the natural numbers, basic rules of arithmetic, finite induction.

The Axiom of Choice and equivalent statements……..4
(H §§ 15-18)

Formulation of the Axiom of Choice, Zorn's Lemma, well ordering, transfinite recursion and induction.

Infinite ordinals and cardinals……7
(H §§ 19-25)

Ordinal numbers and their arithmetic, the Schroeder-Bernstein Theorem, countable and uncountable sets, cardinal numbers and their arithmetic.