

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. | |