CALIFORNIA STATE UNIVERSITY, SACRAMENTO
Department of Mathematics and Statistics
SYLLABUS

Math 210 A-B: Algebraic Structures

Prerequisite: Math 110B. Math 210A is prerequisite to Math 210B. Sequence begins every other Fall.

General algebraic systems and concepts; groups; rings; fields; vector speaces; Galois theory.
OUTLINE:

I. Group Theory
   a. Definition and examples
   b. Subgroups and Lagrange=s theorem
   c. Normal subgroups, qotient groups and homomorphisms
   d. Automorphisms
   e. Permutation groups and Cayley=s theorem
   f. Group actions
   g. Class equation
   h. Sylow=s theorem
   I. Direct products
   j. Fundamental theorem of finite abelian groups

II. Ring Theory
   a. Definition and examples
   b. Ideals, quotient rings and homomorphisms
   c. Maximal and prime ideals
   d. Field of quotients of an integral domain
   e. Euclidean rings
   f. Principal ideal rings
   g. Polynomial rings

III. Vector Spaces
   a. Definition and examples
   b. Linear independence and bases
   * c. Dual spaces
   * d. Inner product spaces

IV. Field Theory
   a. Extension Fields
   b. Roots of polynomials and splitting fields
   c. Construction with straightedge and compass
   d. Galois theory
   e. Solvability by radicals

*Optional

The written exam in Algebra will cover the contenet of the non-optional sections of this outline.

REFERENCES: TOPICS IN ALGEBRA by Herstein
BASIC ALGEBRA I by Jocobsen, Dummit, & Foote

Revised Spring 1996