DEPARTMENT OF MATHEMATICS
SYLLABUS

Course # & Name: MAT 150A: Modern Algebra

Recommended Text(s) & Price: Algebra, Artin, Prentice Hall
ISBN 0-13-004763-5 ($114)

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UPC Approval Date: Spring 2009
(Updated 9/09/2009)

Lecture(s)	Sections	Comments/Topics
Week 1		Permutations and permutation matrices; Determinants (optional, covered in MAT 67); the definition of a group [option – Finite fields from Chap. 3 and $GL_n(F_p)$, $SL_n(F_p)$ as examples of groups].
Week 2		Subgroups; Homomorphisms; Isomorphisms (might review diagonalization).
Week 3		Focus on examples (D_n, S_n, A_n, in particular for n = 3,4, the groups of order 8, cycle notation and conjugation in S_n); Cyclic groups, introduction to fields, rings and groups; Cosets.
Week 4		Products of groups; Quotient groups; Modular arithmetic.
Week 5		Orthogonal matrices and rotation (systems of differential equations and matrix exponentials; Optional, covered in MAT 67); Symmetry of plane figures; The group of motions of the plane.
Week 6		Finite groups of motions; Discrete groups of motions/the wallpaper patterns.
Week 7		Group operations (focus on examples); Operation of cosets; The Counting Formula (focus on examples); Application of Burnside's Formula (optional; Papantonopoulou is a good reference).
Week 8		Finite Subgroups of the rotation group (Tetrahedral group); Operations of a group on itself; Class equation.
Week 9		Operations on subsets; Sylow Theorems; The Groups of order 12.
Week 10		Computations in the Symmetric Group; The free group; Generators and relations.

Additional Notes:

If there is time, one may cover select parts of Chapter 9.