

APPLIED ALGEBRA (MTH 339)
 SYLLABUS (Outline of topics only. Exercises TBA in class.)

TEXT: Contemporary Abstract Algebra, Joseph A. Gallian, 6th Edition, 2006,
 Houghton Mifflin, ISBN 0-618-51471-6.

Day	Ch.	Topic
1a	0	Background: divisibility and modular arithmetic; application to error detection. Supplementary reading*: Polynomials and factorization (p 291-97; 312)
1b	0	Mathematical induction. Equivalence relations.
2a	0,1	Functions and composition. Isometries (p 454-456). Symmetries of a square and other regular polygons; dihedral groups.
2b	2	Groups: definition, examples.
3a	2	Groups: notation; properties.
3b	3	Subgroups; subgroup tests; subgroup generated by a group element.
4a	3	Subgroup examples; Center, Centralizer.
4b	4	Cyclic groups: examples, properties.
5a	4	Classification of subgroups of cyclic groups.
5b	0-4	Review
6a		Test 1
6b	5	Permutations: examples and notation. Symmetric Group.
7a	5	Permutations: cycle decomposition; even and odd permutations; Alternating Group.
7b	6	Group Isomorphisms: definition and examples. Cayley's Theorem.
8a	6	Properties of isomorphisms; automorphisms.
8b	7	Cosets; Lagrange's Theorem.
9a	7	Applications of cosets. Supplementary reading: Classification of Finite Symmetry Groups (Ch 27).
9b	8	External Direct Product: definition, examples, properties, applications.
10a	0-8	Review
10b		Test 2
11a	9	Normal Subgroups; Factor Groups (Quotient Groups).
11b	9	Applications of Factor Groups; Internal Direct Product.
12a	10	Group Homomorphisms: definition, examples, properties.
12b	10	Homomorphisms: further properties.
13a	10	First Isomorphism Theorem. Homomorphism kernels and normal subgroups.
13b	11	Fundamental Theorem of finite Abelian Groups. Supplementary reading: Finite Simple Groups (p 419-23)
14a	12	Rings and Fields: preview. Supplementary reading: Coding Theory (Ch 31); Solvability of polynomials by Radicals (p554-55).
14b	0-12	Review
15		FINAL EXAM

*Supplementary reading is intended to give previews of advanced topics and historical context.