Harvard Extension School Open Learning Initiative --
MATH E-222 Syllabus (adapted from the Fall 2003 Syllabus)

Required text: *Algebra,* M. Artin (Prentice Hall 1991)

Homework
Problems will be assigned in each lecture, and should be submitted at the beginning of the following lecture. Collaboration between students is strongly encouraged, and must be accompanied by complete understanding of all solutions and crediting of collaborators. You should note that problem sets are a critical part of the learning process. Final exam scores tend to replicate performance on homework.

Midterm exams
There were two midterm exams in mid-October and late November, each during the usual class hour.

Final exam and review
The Final Exam will be closed book with no aids permitted.

Grading
The final grade will be the maximum of the final exam grade and 40% final + 20% first midterm + 20% second midterm + 20% problem sets.

Prerequisites
Math 21b and experience writing proofs (Math 101, 121, or equivalent).

Schedule
Week 1. Review of linear algebra. Groups. Examples of groups. Basic properties and constructions.

Week 2. Permutations. Cosets, Z/nZ.

Week 3. Quotient groups, first isomorphism theorem. Abstract fields, abstract vectorspaces. Construction and invariants of vectorspaces.

Week 4. Abstract linear operators and how to calculate with them. Properties and construction of operators.

Week 5. Exam 1. Orthogonal groups.

Week 6. Isometries of plane figures. Cyclic and dihedral groups. Finite and discrete subgroups of symmetry groups.

Week 7. Group actions. Basic properties and constructions. Groups acting on themselves by left multiplication. Groups acting on themselves by conjugation.

Week 8. A_5 and the symmetries of an icosahedron. Sylow theorems. Study of permutation groups.

Week 9. Rings. Examples of rings. Basic properties and constructions.

Week 10. Quotient rings, extensions of rings. Integral domains, fields of fractions.

Week 11. Exam 2. Special lecture.

Week 12. Euclidean domains, PIDs, UFDs. Gauss' lemma. Eisenstein's criterion. Algebraic integers.

Week 13. Structure of ring of integers in a quadratic field. Dedekind domains. Ideal class groups.

Week 14. Wrap-up.