Math 362 Syllabus
Spring, 1998
Instructor: Joachim Rosenthal

Textbook: Galois theory by Ian Stewart, 2nd edn, Chapman and Hall, 1992.

Chapter 1
1.1 General properties of rings
1.2 Characteristic of a field
1.3 Fields of fractions
1.4 Polynomials
1.5 Euclidean algorithm

Chapter 2: Factorization of polynomials (review)}
2.1 Irreducibility
2.2 Eisenstein's criterion
2.3 Zeros of polynomials
2.4 Symmetric polynomials (fundamental theorem stated but not proved)

Chapter 3: Field Extensions
3.1 Field extensions
3.2 Simple extensions
3.3 Constructing simple extensions
3.4 Classifying simple extensions

Chapter 4: The degree of an extension
4.1 The tower law
4.2 Algebraic Numbers

Chapter 5: Ruler and Compass
5.1 Algebraic formulation
5.2 Impossibility proofs (duplication of cube, trisection of angle)

Chapter 6: Transcendental Numbers
was not covered and left as reading.

Chapter 7: The idea behind Galois theory
(was covered)

Chapter 8: Normality and separability
8.1 Splitting fields
8.2 Normality
8.3 Separability
8.4 Formal Differentiation

Chapter 9: Field degrees and group orders
9.1 Linear independence of homomorphisms

Chapter 10: Monomorphisms, automorphisms and normal closures
10.1 K-monomorphisms

Chapter 11: The Galois correspondence
11.1 The fundamental theorem

Chapter 12: A specific example
(Assigned the HWK set 12.1--12.5 and went over it in class).

Chapter13: Soluble and simple groups
13.1 Soluble Groups
13.2 Simple groups
13.3 p-groups (sketching proof of
simplicity of alternating group A_5

Chapter 14: Solution of equations by radicals
14.1 Historical Introduction
14.2 Radical Extension
14.3 An insoluble quintic
(Did outline the main theorem soluble group <--> solvable
by radicals)

Chapter 15: The general polynomial equation
was not covered

Chapter 16: Finite fields
16.1 Structure of finite fields
16.2 Multiplicative group.
(Here I went quite a bit beyond the book. The students seemed not
to know clearly the fundamental theorem for abelian groups
(needed for showing that the multiplicative group is cyclic). So
I did proof this theorem, derived explicitly the Galois
correspondence and provided material on how to compute with
extension fields of the binary field. In the last week there was
time to cover some coding theory).