MATH 404
Modern Algebra II
Syllabus

Spring 2012

Instructor: Sam Smith, Mathematics
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Office Hours: Mon 11:00-1:00, Tue 1:00-4:00 or by appointment.
Texts: Gallian, Contemporary Abstract Algebra, Sixth Edition, Houghton-Mifflin
Course Description:. In this course, we will study the three central objects in abstract algebra: groups, rings and fields. We begin with the study of rings. The key concepts in ring theory generalize familiar notions from elementary number theory. We will define and study divisibility, factorization, irreducibility and related notions for a general (commutative) ring. We will focus particularly on the important special case of polynomial rings. Next we turn to fields and the beginnings of Galois Theory, i.e., the theory of field extensions. This will lead us to with some striking applications of field theory, namely the impossibility theorems, due to Abel and Galois, that resolved the centuries-old geometric construction problems of the ancient Greeks. Finally, we will resume the study of finite groups begun in Modern Algebra I. We will prove the famous Sylow Theorems and use these results to obtain classification theorems for groups of small order.
Course Structure: Your responsibilities for this course are: seven written homework assignments, two in-class exams and a cumulative final exam. The dates for the assignments and tests are indicated on the attached course calendar. The last assignment, Assignment 7, is due at the final exam. The cumulative final exam will be given at the date scheduled by the registrar.
Learning Goals: Students will know and be able to prove basic theorems in ring theory regarding units, ideals, integral domains, prime and maximal ideals and quotient rings. Students will know and be able to prove basic theorems in the context of polynomial rings over **Z** or a field regarding irreducibility, factorization, and divisibility. Students will know and be able to prove basic theorems in field theory, specifically as regards algebraic and transcendental extensions. Students will know and be able to prove basic theorems regarding the impossibility of geometric constructions. Students will be able to apply the class equation and Sylow's Theorems to determine the number and type of groups of small orders.
Grades: I will determine final course grades by curving your total scores, out of a possible 750 points, computed as follows: Each of the seven written assignments will be worth 50 points. The in-class exames will be worth 100 points and the final exam 200 points.
Written Assignments. I will hand out problem sets approximately once every 2 weeks. (See the attached calendar). Please treat all exercises as proofs. If computations are involved, please justify your steps, Generally, you should state theorems and then give complete, careful argument for why the satement is true. All proofs should be in grammatical sentences. Late writing assignment can be turned in for reduced credit up to the date that the next assignment is due.

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Calendar

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Tuesday	Thursday
Jan 17	Jan 19
Jan 24	Jan 26 **Assignment 1 Due**
Jan 31	Feb 2
Feb 7	Feb 9 **Assignment 2 Due**
Feb 14	Feb 16
Feb 21	Feb 23 **Assignment 3 Due**
Feb 28	Mar 1 **Midterm**
Mar 6 **< ---------- Spring Break**	Mar 8 **No Class ---------- >**
Mar 13	Mar 15
Mar 20	Mar 22 **Assignment 4 Due**
Mar 27	Mar 29
Apr 3	Apr 5 **Assignment 5 Due**
Apr 10	Apr 12 **Test 2**
Apr 17 **No Class - Easter**	Apr 19 **Assignment 6 Due**
Apr 24	Apr 26
May 1 **< ---------- Final**	May 3 **Exams ---------- >**