Syllabus
Mat 5420, Winter 2007

Instructor: K. Magaard
Office: 1189 FAB
Office hours: Tuesday-Thursday 3:15-4:15 or by appointment.
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Required Text:

1. Beachy and Blair, Abstract Algebra (Third Edition), Waveland Press, Prospect Heights, Illinois, 2006.

Course description: In the process of solving some long standing mathematical problems (the impossibility of certain ruler and compass constructions and the impossibility of solving the general degree 5 equation) early 19'th century mathematicians such as Galois and Abel developed a body of new techniques which is now regarded as the beginning of what we currently call abstract or modern algebra. Today, as it has been the case since the days of Galois and Abel, abstract algebra is a very active field of mathematical research that is continuing to make significant contributions to such diverse fields as physics, electrical engineering, cryptography and coding theory. Here we will define and derive some basic properties of the most fundamental objects of abstract algebra. We will study groups, rings, fields and vector spaces and the structure preserving maps (homomorphisms) between them.

Grading:
Homework 30%
(Homework is assigned every Tuesday and due the following Tuesday. Late work will not be accepted). Midterm 35%
Final 35%
(A missed exam will count as zero).
Prerequisites MAT 2030 and 2250 are the formal prerequisites. That being said, past experience has shown that this course requires a **high** degree of mathematical sophistication. Some students might wish to take MAT 5000, Fundamental Concepts of Mathematics and Proof Writing, before or concurrently with MAT 5420. The same can be said for many of the 5000 level mathematics courses especially MAT 5400, 5410, 5520 and 5600.
What to review: It will also be helpful to review some linear algebra from MA 2250, particularly the definitions and examples of vector spaces, linear transformations. In this course we will primarily study groups and homomorphisms. Vector spaces are abelian groups with additional structure and linear transformations between vector spaces are homomorphisms of vector spaces.

Course plan:

1. **Week 1** Sections A.1 through A.3 and 1.1.
2. **Week 2** Sections 1.2, 1.3, and A.4.
3. **Week 3** Sections 1.4, 2.1, 2.2
4. **Week 4** Sections 2.3, A.5, 3.1
5. **Week 5** Sections 3.2, 3.3, 3.4.
6. **Week 6** Sections 3.5, 3.6, 3.7.
7. **Week 7** Sections 3.8, 7.1.
8. **Week 8** Sections 7.2, 7.3, 7.4.
9. **Week 9** Review and Midterm Thursday March 8.
10. Spring Break
11. **Week 10** Sections 4.1, 4.2.
12. **Week 11** Sections 4.3, 4.4
13. **Week 12** Section 5.1, 5.2
14. **Week 13** Sections 5.3, 5.4
15. **Week 14** Section 5.4 and Review
16. **April 26** Final exam