MATH 6302 – Modern Algebra – Fall 2018
Syllabus

Instructor: Dr. Gordon Heier
Contact Information:
    Office: 666 PGH
    Office Hours: M 3:30pm-5:00pm, or by appointment
    Email: heier@math.uh.edu
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Lecture: MW 1:00pm - 2:30pm in CV N115

Prerequisites: Graduate standing or consent of the instructor

Exams: Midterm Exam: Wednesday, Oct. 24, during regular class
    Final Exam: Friday, Dec. 7, 2pm-5pm[1]

Text: *Abstract Algebra* by David Dummit and Richard Foote, 3rd Edition

Homework in the form of problem sets will be assigned on a regular basis and will be due as described on each set. Late homework will not be accepted.

Attendance: Attending classes and exams is mandatory for all students. Missing class makes a student liable to missing important information. Substantial documentation is necessary to receive any kind of excuse or make-up privilege.

Grades: The homework and midterm exam will each account for 30 percent of your grade, the final exam for the remaining 40 percent.

Disability: If you think or know that you have a disability that needs special accommodation, please see me at the beginning of the semester so that the proper steps can be taken.

Academic Dishonesty will not be tolerated and dealt with appropriately.

UH CAPS Statement: Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the "Let's Talk" program, a drop-in consultation service at convenient locations and hours around campus.
http://www.uh.edu/caps/outreach/lets_talk.html

Course Content: This course covers the material relevant for our departmental Preliminary Examination in Algebra. For further details about the content, see the next page.

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[1] Exam dates are subject to change. Please listen carefully to announcements made in class.

Main topics likely to be discussed are:

- Group theory: introduction to group theory, subgroups, quotients and homomorphisms, group actions, semidirect products, Sylow theorem, finitely generated abelian groups.
- Ring theory: introduction to rings and ideals, integral domains, Euclidean domains, principal ideal domains (PIDs), unique factorization domains (UFDs)

Sections from the textbook likely to be discussed:

1.1 Intro to groups: basic axioms and examples
1.3 Symmetric groups
1.6 Homomorphisms and isomorphisms
2.1 Subgroups: definitions and examples
2.2 Centralizers and normalizers, stabilizers and kernels
2.3 Cyclic groups and cyclic subgroups
2.4 Subgroups generated by subsets of a group
3.1 Quotient groups and homomorphisms: quotient groups and examples
3.2 More on cosets and Lagrange's theorem
3.3 The isomorphism theorems
3.5 Transpositions and the alternating group
4.1 Group actions and permutation representations
4.2 Groups acting on themselves by left multiplication
4.3 Groups acting on themselves by conjugation
4.4 Automorphisms
4.5 Sylow's theorem
5.1 Direct products
5.2 The Fundamental Theorem of finitely generated abelian groups
5.5 Semidirect products
7.1 Introduction to rings
7.2 Polynomial rings, matrix rings, and group rings
7.3 Ring homomorphisms and quotient rings
7.4 Properties of ideals
7.5 Rings of fractions
7.6 The Chinese Remainder Theorem
8.1 Euclidean domains
8.2 Principal ideal domains (PIDs)
8.3 Unique factorization domains (UFDs)