

## **MATH 515 Abstract Algebra I**

**Text:** Abstract Algebra, by David Dummit and Richard Foote, third edition

**Instructor:** Yuanqian Chen

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**Office Hour:** Tuesdays and Thursdays: 12:45-2:00pm; 4:15-5:15pm;  
Wednesday: 8:00-9:00am or by appointment.  
Please feel free to stop in anytime, an appointment is not necessary.

### **Students For Whom the Course Is Intended:**

This course is intended for M.S. and M.A. students and is a required course for students in the M.A. program in mathematics. With a special permission, a senior could take the course

### **Course Description:**

The purpose of the course is to give students more advanced material in the area covered in math 366 and to introduce the students to other major algebraic topics, both modern and classical, which are not covered in math 366.

### **Topics Covered:**

Part I Group Theory

Chapter 1 Introduction to Groups

- 1.1 Basic Axioms and Examples
- 1.2 Dihedral Groups
- 1.3 Symmetric Groups
- 1.4 Matrix Groups
- 1.5 The Quaternion Group
- 1.6 Homomorphisms and Isomorphisms
- 1.7 Group Actions

Chapter 2 Subgroups

- 2.1 Definition 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
- 2.5 The Lattice of Subgroups of a Group

Chapter 3 Quotient Groups and Homomorphisms

- 3.1 Definitions and examples
- 3.2 More on Cosets and Lagrange's Theorem
- 3.3 The Isomorphism Theorems

- 3.4 Composition Series and the Holder Program
- 3.5 Transpositions and the Alternating Group

Chapter 4 Group Actions

- 4.1 Group Actions and Permutation Representation
- 4.2 Group Acting on Themselves by Left Multiplication - Cayley's Theorem
- 4.3 Group Acting on Themselves by Conjugation - The Class Equation
- 4.4 Automorphisms
- 4.5 The Sylow Theorem
- 4.6 The Simplicity of  $A_n$

Chapter 5 Direct and Semidirect Product and Abelian Groups

- 5.1 Direct Products
- 5.2 The Fundamental Theorem of Finitely Generated Abelian Groups
- 5.3 Tables of Groups of Small Orders
- 5.4 Recognizing Direct Products
- 5.5 Semidirect Product

<b>Grading:</b>	Three Tests (75 minutes, 100 points each)	300
	Final Exam	150
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		450

If your total points are: 405--450, you will get at least A<sup>-</sup>.  
 360--404, you will get at least B<sup>-</sup>.  
 315--359, you will get at least C<sup>-</sup>.  
 270--314, you will get at least D<sup>-</sup>.

This is exactly how your grade will be calculated:

405-419: A <sup>-</sup>	420-450: A	
360-374: B <sup>-</sup>	375-389: B	390-404: B <sup>+</sup>
315-329: C <sup>-</sup>	330-344: C	345-359: C <sup>+</sup>
270-284: D <sup>-</sup>	285-299: D	300-314: D <sup>+</sup>

**Test Date:**

First test: Thursday, September 23,  
 Second test: Thursday, October 21,  
 Third test: Thursday, November 18.

Final exam will be on Tuesday, December 14, 2010, 5:00-7:00PM

The last day to withdraw from a course is Monday, October 25, 2010. Approvals for withdrawal are not required. After October 25, withdrawals are allowed only under extenuating circumstances and require approval of the course instructor, department chair and dean of the School of Arts and Sciences.

In the event of a weather emergency with required curtailment or cancellation of classes, listen to WTIC (1080AM) or call (860) 832-3333 for the "general snow message".

Please contact me privately to discuss your specific needs if you believe you need course accommodations based on the impact of a disability, medical condition, or if you have emergency medical information to share. I will need a copy of the accommodation letter from Student Disability Services in order to arrange your class accommodations.