

**Mathematics MAT 334 : Abstract Algebra**  
**Spring 2005**  
**MF 2:00 pm - 3:15 pm, Room 117**

**Instructor:** Dr. Brad Emmons

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**Office Hours:** Monday and Friday 12:30 - 1:30 pm, Tuesday and Thursday 1:00 - 2:30 pm

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### **Course Materials**

Contemporary Abstract Algebra, Fifth Edition, *Joseph A. Gallian* (required)

### **Introduction**

Abstract Algebra, as its name implies, allows us to generalize (abstract) many of the characteristics of the familiar integer, rational, and real number arithmetic to other number systems. You may have noticed that we can factor integers, and we can also factor polynomials. So in some sense these two systems are very similar. We will attempt to classify systems according to what properties they have. Warning: Remember how happy you were when you found out that  $6 \times 8 = 8 \times 6$ ? It turns out that this commutivity does not always hold in all systems! One reason that we classify systems by the properties of their operations is that once we have proved (yes, we will be proving things) something about one system, we will not have to reprove it for another system with the same properties.

One of the major goals of a class in abstract algebra is for each student to become comfortable with proofs, examples, and counterexamples. These are vital skills in thinking mathematically. You cannot hope to achieve this without doing mathematics. For this reason we will become colleagues this semester. Throughout the semester I may ask you to come to the board and show the rest of the class your work from a homework assignment. One ground rule is that we are allowed to argue or disagree about the best way to attack a problem, but it must be done with respect.

We will start out by exploring certain properties of functions and sets before heading on to the main topics of the course, which are groups, rings, and fields. In most Abstract Algebra courses groups are treated as objects with a couple of properties. But they do have a very nice visual representation, which we will explore as well.

### **Exams**

There will be a midterm exam given in class as well as a final cumulative exam. The exams will test your understanding of concepts related to groups and other algebraic structures. The midterm exam is scheduled for Friday, March 11 and will count for 25 percent of your final grade. The final exam will be held on Thursday, May 5 from 9:00 - 11:30 a.m.. The final will count for 25 percent of your final grade. There will be NO make-ups for missed exams. Please look over your schedule as soon as possible. If you see a potential conflict, inform me immediately.

### **Homework**

The best way to learn Mathematics is to solve problems. In addition to assignments to be turned in, there will also be problems to solve which we will consider "moral assignments". The problems on the moral assignments will not be turned in for a grade; however, you are responsible for the material on these assignments. You will always be given at least a week to work on the assignments to be turned in. But I will expect you to work on the problems before the next class period. You should be comfortable enough with the problems to work on them and discuss them in front of the class. Homework will count for 20% of your final grade.

### **Quizzes**

Every other Friday, starting with January 28th, we will have an in-class quiz. There will be a total of 6 quizzes throughout the semester. You should treat the quizzes as mini-exams, covering material from approximately 4 days worth of course work. The quizzes will consist of a few problems similar to problems from your graded homework, and they are to make sure that you are keeping up with the concepts presented in class, and to identify where you are having problems before you take the exams. The quizzes will count for 20% of your final grade.

### **Attendance**

While there is no official attendance policy for MAT 334, class participation counts for 10% of your

final grade. I strongly suggest you come to class prepared every day.

### **Grading**

Your grade in this course will be based on four main factors: homework, quizzes, exams, and class participation. The homework will be worth 25% of your final grade, the quizzes 20%, the exams 55%, and participation 10%. In addition to these factors, minor ethereal factors such attendance, attitude, and improvement over the course of the semester can also affect your grade. To determine your final grade, 90–100% = A, 80–89% = B, 70–79% = C, 60–69% = D, 59 and below = F, with the top two percents receiving a + and the bottom two percents receiving a –.

### **Calculators**

The use of calculators will not be allowed on any quizzes or exams. None of the work will require any sophisticated computations. You may use a calculator when working on your homework to check your work. However, since will not be allowed to use it on the exam, I suggest you do as much work without your calculator as possible.

### **Important Dates**

Tuesday, January 25 – Last Day to Drop/Add

Friday, March 11 – Midterm Exam

Monday, March 14 - Friday, March 18 – Spring Break (no class)

Friday, April 1 – Deadline for WD or P/F

Tuesday, May 3 – Last Day of Classes

Wednesday, May 4, Sunday, May 8 – Study Days

Thursday, May 5, 9:00 a.m. - 11:30 a.m. – Final Exam

### **Suggestions**

Come to class with your homework assignment completed every day

Study for at least 30 minutes each day in addition to completing your homework assignment

Read the section we will be covering *before* we cover it in class

Do not fall behind!

Come to office hours to discuss homework and concepts. I am here to help!

## Syllabus

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Term : Spring 2005

Week 1	January 21	Course Policies, Syllabus, Introduction, Chapter 1
Week 2	January 24 January 28	Chapter 2 - Groups Chapter 2 (continued) – Quiz I
Week 3	January 31 February 4	Chapter 3 - Finite Groups; Subgroups Chapter 3 (continued)
Week 4	February 7 February 11	Chapter 4 - Cyclic Groups Chapter 4 (continued) – Quiz II
Week 5	February 14 February 18	Chapter 5 - Permutation Groups Chapter 5 (continued)
Week 6	February 21 February 25	Chapter 6 - Isomorphisms Chapter 6 – Quiz III
Week 7	February 28 March 4	Chapter 7 - Cosets and Lagrange's Theorem Chapter 7 (continued)
Week 8	March 7 March 11	Review Midterm Exam
Week 9	March 15 March 19	NO CLASS NO CLASS
Week 10	March 21 March 25	Chapter 8 - External Direct Products Chapter 8 (continued)
Week 11	March 28 April 1	Chapter 9 - Normal Subgroups and Factor Groups Chapter 9 (continued) – Quiz IV
Week 12	April 4 April 8	Chapter 10 - Group Homomorphisms Chapter 10 (continued)
Week 13	April 11 April 15	Chapter 11 - Fundamental Theorem of Finite Abelian Groups Chapter 11 (continued) – Quiz V
Week 14	April 18 April 22	Chapter 12 - Introduction to Rings Chapter 12 (continued)
Week 15	April 25 April 29	Chapter 13 - Integral Domains Chapter 13 (continued) – Quiz VI
Week 16	May 2	Review