

Math 321 — Modern Algebra — Spring '08

TΘ 12:00–1:15 in Manchester 124, CRN # $3 \cdot 5^2 \cdot 181$

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ABOUT THIS COURSE: Abstract algebra is a branch of mathematics that is (probably!) unlike any of the other mathematics you have encountered. To put it crudely: where much of the mathematics you have seen is concerned with “objects,” abstract algebra is concerned with “relationships between objects.” As we’ll see, the subject can thereby be applied in many different fields. But since the precise objects are no longer the main items of interest, the material will look very abstract to you.

We will build the subject up from scratch. The only essential prerequisite is some mathematical sophistication. In particular, I’ll assume you know something about how to construct a proof of a mathematical statement. I will try to review some of the techniques (e.g., proof by contradiction, proof by contradiction) as we go along. A major goal of the course is to improve your ability to create and write proofs. Linear algebra is also listed as a prerequisite as it is such a rich source of examples for abstract algebra. But we won’t be using anything really deep from the field of linear algebra. Knowing how to multiply matrices and the basic properties of the determinant will be enough.

The majority of the course will be a straightforward, axiomatic development of the subject from scratch. We will cover most of Chapters 0-11 from the text. We will also cover one or two applications from later chapters.

An underlying theme to the entire course will be the notion of symmetry. I will start and end the course with some geometric types of symmetry. Hopefully, this will help motivate our first big definition (the “group”) and also serve as an application to a number of the ideas and theorems we develop in the course. And anyway, symmetry is pretty.

TEXT: *Contemporary Abstract Algebra*, Gallian. 6th edition.

OFFICE HOURS: You are welcome to stop by my office at any time. During scheduled office hours, I can always be found in my office, Manchester 338; no appointment is necessary. I also check my email frequently and am happy to try to answer questions and/or give hints on homework that way. We can also schedule meetings at times convenient to you.

WRITTEN HOMEWORK:

- (1) Homework assignments will be due every Thursday.
- (2) I encourage you to come talk to me with questions on the homework. I don't expect you how to necessarily know how to do each problem right away. The point of the homework is not only to check that you've learned what we have gone over in class. Struggling with the homework problems is also a very important means by which you learn the material.
- (3) Assignments should 1) be stapled 2) have your name on them and 3) be legible. Failure to follow these guidelines will result in points being deducted at the discretion of the grader.
- (4) Assignments are due at the beginning of class on the day specified. Late assignments are accepted for good reasons (e.g. — family emergencies, serious illness) without penalty. Otherwise they are accepted at my discretion and with points deducted. If you know you will be absent, please talk to me beforehand or make arrangements to hand in the work.
- (5) You are welcome to work in groups on any of the homework assignments. However, you must hand in your own written work; in particular you must understand what you have written down and cannot just copy from someone else. If your collaborators are not members of the class, you must list them at the top of your assignment. Please reference any additional sources you use in completing the assignments.
- (6) No homeworks will be dropped. If you miss an assignment for a “good reason” you are responsible for handing it in as soon as circumstances permit.

EXAMS: There will be two exams during the semester and then a final. On each exam, the majority of the points will come from open-book/take-home questions. I may also make part of the exam closed book. For the latter, I may administer it in class or, more likely, let you do it on your own under the Honor Code.

What	Percent of grade	Chapters covered (roughly)	When
Participation	5%		
Homework	40%		
Exam 1	15%	1 to 4	Due Thu. Feb 14
Exam 2	20%	5 to 8	Due Thu. Mar 27
Final	20%	9 to 11	TBA

GRADING: After each exam, I will tell you what your final grade would be if I had to base it solely on the homework and exams completed up until that point. Exam and homework grades will be curved, if necessary, such that at least an A- is earned for an average of 90, at least a B- for an average of 80, etc. If you have a conflict with an exam you *must* talk to me at least a week ahead of time.