MATH 433, Abstract Algebra
Fall 2013

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August 23, 2010

1 Introduction

The only formal prerequisite for this course is Linear Algebra (Math 290) but, as preparation for taking a 400 level course, you should have taken at least one 300 level course — preferably proof-based. This means you should be familiar not only with the standard methods and techniques for thinking about and solving proof-oriented mathematical problems but also with the basics of developing and writing proofs.

Although there are few prerequisites, Abstract Algebra 433 is a senior level course. Faculty in mathematics consider this course a capstone for those of you pursuing either a career in secondary education or graduate studies in mathematics.

By taking Math 433, you will acquire a deeper knowledge of linear algebra as well as learn the fundamentals of group theory. This latter topic provides an exceptional example of the true power of algebra: take a useful, concrete example and abstract its basic concepts to such a level that the abstraction can be applied to many new situations. In particular, group theory has applications to quantum theory, molecular structure, symmetry (ranging from the structure of crystals to the mathematics describing attempts at "Grand Unified Theories" of everything), coding theory, the structure of complex numbers, the topology of the universe, and much more.

We will cover the material in chapters 1-14 of our text. You are welcome to use additional textbooks as resources for this course. There are an abundance of useful books in the library and mathematics reading room.

For an official description of this course, see the department's Math 433 Syllabus at `http://www.math.ups.edu/~matthews/Syllabi/MA_433_434_Syllabus.pdf`.

Besides learning group theory, by the time we finish this course, you should also have refined the following skills.

- read a mathematical text for content and deep understanding (see `http://www.cse.buffalo.edu/~rapaport/howtostudy.html` for an excellent description of how to read mathematics and other efficient ways to study),
- analyze a given problem to determine which tools should be used in its solution,
- use a variety of strategies to determine and prove a solution of the given problem, and
- follow accepted mathematical style to present an accurate and carefully written formal proof of your solution.

2 Course Information

2.1 Textbook

The textbook is *Abstract Algebra*, Theory and Applications, by Thomas Judson. The textbook is open source and I will be following the August 16, 2013 version for this course. If you use an older edition, it is your responsibility to be careful about numbering of chapters and exercises.

2.2 Sage

There are Sage exercises for each chapter. These are due on the "problem session" day following the lectures for each chapter. They are to be submitted as a Sage worksheet attached to an email sent to my university email address. We will go over the details in class.

2.3 Basic Information

Bryan Smith	TH 390D	879-3562	bryans[at]ups.edu `http://math.ups.edu/~bryans/`
Math 433A	Thompson 374	M,F	9:00 - 9:50 A.M.
	Thompson 384	T,Th	8:30 - 9:20 A.M.
Office Hours		Tue, Thu	9:30 - 10:00 A.M 1:30 - 2:00 P.M. 3:00 - 3:30 P.M.
		Mon, Fri	2:30 - 3:30 P.M.
		Other times	by appointment

2.4 Examinations

There will be eleven one-hour exams (planned schedule dates are on the included tentative schedule). All but two cover a single chapter and I will drop the two lowest exam scores. The final examination is Monday December 16 from 8:00-10:00 A.M. **Do not make travel arrangements that conflict with this scheduled examination.**

2.5 Homework

A selection of homework problems will be assigned for each chapter but will not be collected. However, you should at least read (and possibly work) all other homework problems. One day will be reserved at the end of all but two chapters to discuss the homework problems.

You are responsible for ensuring that you are learning from the homework problems. Diligently working the assigned problems and participating fully in the classroom discussions will go a long way toward ensuring your understanding. Extra help, discussion, and clarification are available during my office hours as are any other topics associated with the course.

2.6 Reading Questions

Reading questions are posted on the course webpage along with directions for submitting answers. They are due by 5:00 AM the morning of the day we begin discussing a new chapter (as shown on the schedule). Submit them to my university email address.

2.7 Course Information Updates

If you wish, I will post (and update) a grade report on your current standing in the class on my university web page. You should keep track of your grades on the various assignments and check them against these reports. If there are any discrepancies they should be dealt with immediately.

To have your information posted you need to print your name, the date, the class (MATH 433), and a code on a sheet of paper. Then sign the paper and physically hand it to me. The code is to be a sequence of up to 23 symbols I can type on a keyboard.

2.8 Total Points

Reading Questions	5%
Sage Exercises	15%
Exams	60%
Final	20%