MATH 434, Abstract Algebra
Spring 2011

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Contents

1 Introduction

Although there are few prerequisites, Abstract Algebra 434 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.

In this course, you will continue to acquire a deeper knowledge of linear algebra, investigate a bit more of group theory and learn the basics of a the algebraic structures called rings, modules and fields.

As a change from last semester, please think of our text, not as the course bible, but rather as your primary resource for filling in details of the material covered in class. I also recommend that you take the time to find and use additional references. In particular, there are an abundance of useful books in the library and mathematics reading room.

For an official description of this course, see MATH 434 Syllabus[4].

By the time we finish this course, you should have refined the skills outlined in the information sheet for first semester abstract algebra as well as enhancing your abilities to research, understand, summarize, and verbally present an application of the concepts you have learned in this course.

2 Course Information

2.1 Textbook

The textbook is *Abstract Algebra*, Theory and Applications, Thomas Judson, ©2009, GNU Free Documentation License

2.2 Basic Information

You can find information pertinent to all of my classes at the link below and, once there, information specific to this class by clicking on the Math 434 link.

`http://math.ups.edu/~bryans/` [1]

Location Th 374, 9:00-9:50am M,F, 8:30-8:20am T,Th

2.3 Office Hours

Professor Bryan Smith	879-3562	bryans[at]pugetsound.edu	Thompson Hall 390D
Office Hours	Mon	1:00-1:50pm	
	Tue	8:00-8:25am, 10:30-10:55am, 3:00-3:20pm	
	Wed	3:00-4:30pm	
	Thu	3:30-4:00pm	
Non-Exam Weeks Only	Thu	8:00-8:25am, 10:30-10:55am	
	Fri	3:00-3:50pm	

2.4 Day to Day Structure

The class weeks will be structured in essentially the same way as last semester. One difference is that an appropriate number of days at the end of the semester will be reserved for you to present your application topics to the rest of the class.

3 Examination: Thursday March 10

Since the homework problems will be used to facilitate deep understanding, tests will be used more as a basic check of your knowledge. Hence, there will be one, "straightforward", semester examination.

4 Final Examination: Friday May 13 at 8:00 A.M.

The final will also be "straightforward" and comprehensive. The final cannot be rescheduled so do not plan plane flights (or anything else) that will conflict with it.

5 Homework

Homework will be assigned and collected as it was last semester. I expect a total of 25 problems to be accepted by the end of the semester. However, this semester you do not need to designate any of them as writing problems. Instead, write all problems for an audience consisting of the rest of the class. If I have questions about the quality of your writing I will check your level of exposition by having a classmate read your proof, asking pertinent questions of that reader, and using their feedback to assess the clarity of your writing. Feel free to use (or not) any technology that you like (e.g., Sage, calculators, *Mathematica*, MATLAB, etc.). You may also work with others in solving these problems but there is to be no collaboration on the written exposition of the solutions. Cite each resource you use.

When writing your solutions, you should use LaTeX (or TeX) since you will be required to use it to write your paper (see below).

6 Talk/Paper

Due Dates:

- March 11: Send me a one-page statement of your topic with enough of a bibliography to show that you know you have a reasonable topic. Do not duplicate course material.
- After your topic is accepted and first come, first served: Schedule a time for your oral presentation during the last four class days of the semester. You will have 25 minutes and will be expected to use TeX and Beamer to generate your slides.
- April 18: Submit your final paper. I will make copies available to the other students before your talk.

The last 2 weeks of class will be devoted to talks given by the class members. You may investigate any topic that involves higher algebra. Those of you with interests in physics or chemistry will have no trouble finding many possibilities. Take a look at `http://buzzard.ups.edu/courses/2010spring/m434project.pdf` where Professor Beezer presents a number of possibilities. Other suggestions include: going into more depth on the Sylow theorems, the classification of finite simple groups, combinatorial group theory, knot groups, knot polynomials, quadratic forms, algebraic graph theory, boolean algebras, non-associative algebras, lattice theory, and quantum computing.

You will receive grades on your proposal, the oral presentation of your investigations and the paper that you will write using LaTeX and submit to me electronically. With your permission, I will publish your paper in the *Journal of Undergraduate Mathematics at Puget Sound* that I maintain on my web page. This might prove useful as something to mention when you are interviewing for a job or applying to graduate school.

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.

8 Total Points

Homework	65%
Talk/Paper: Proposal	2%
Talk/Paper: Oral	5%
Talk/Paper: Written	8%
Midterm	10%
Final Examination	10%

References

[1] Bryan Smith's Homepage
`http://math.ups.edu/~bryans/`

[2] Math 434A Course Webpage
`http://math.ups.edu/~bryans/Current/Spring_2011/434Index_Spring2011.html`

[3] Department Calculator Policy
`http://www.math.ups.edu/info/calcpolicy.pdf`

[4] Department Syllabus for MATH 434
`http://www.math.ups.edu/~matthews/Syllabi/MA434Syllabus.pdf`

[5] Location of MikTeX package for using LaTeX `miktex.org`

[6] Development tools for composing LaTeX documents `miktex.org/Links.aspx`

[7] William Rapaport's "How to Study"
`http://www.cse.buffalo.edu/~rapaport/howtostudy.html`

[8] TI-86 Manual
`http://education.ti.com/us/product/tech/86/guide/86guideus.html`