

Math 206A: Algebra

Fall 2020

Course Information and Syllabus

Professor: Nathan Kaplan, nkaplan@math.uci.edu

Zoom Office Hours: Monday, Thursday, 2:00 - 3:15 PM.

If you would like to meet with me at a different time, send me an email and I am happy to find a time that works.

TAs: Alex Sutherland, asuther1@uci.edu , Office Hours: Tuesday, Friday, 2:00-3:00PM.

Discussion Sections: Alex will lead Discussion sections on Zoom from 2:00-2:50 PM Wednesdays. Discussion is not required, but you are highly encouraged to attend!

Course Website: <https://canvas.eee.uci.edu/courses/27318>.

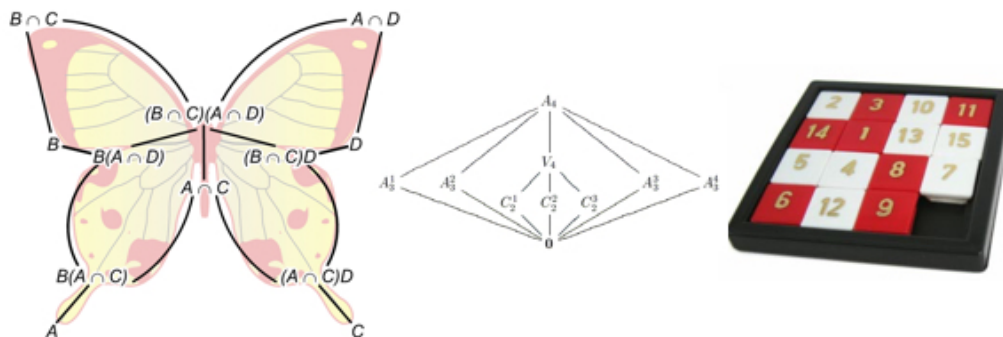
Please check your email address on file with <https://eee.uci.edu> regularly.

Introduction

Welcome to Math 206A online! I know that even after getting some experience in the Spring quarter, learning online is a big challenge for all of us. I want to say at the start that I am going to try to be really flexible and understanding about all the different stuff that people are dealing with right now. I am here to help you get as much as you can out of this remote quarter. If there are issues that come up throughout the course that are making things difficult, please let me know and I will do what I can to help.

Course Goals

Algebra is one of the fundamental areas of mathematics and plays an important role in almost every area of modern mathematics. The goal of the Math 206 sequence is to provide a broad overview of algebra and to give you with a strong foundation that prepares you to pursue more advanced topics in the future. You will develop your algebraic intuition by working with many examples, solving lots of problems, and doing many proofs. Another key goal of this course, particularly for graduate students, is to prepare you for success on the Comprehensive Exam and Qualifying Exam in Algebra.



Course Plan

Here is a description of how I would like this class to work:

1. **Lecture Videos:** Before each assigned lecture time, I will post several 10-15 minute videos covering the material for that day's 'lecture'. My plan is to cover the same material that I would in a traditional lecture format, but to break it up into pieces– I know nobody wants to sit and watch 50 minutes of an online math lecture all at once!
2. **Office Hours:** On Mondays and Thursdays from 2:00 - 3:15 PM, I will host Office Hours using Zoom. My plan for office hours is to answer any questions people have about material from lectures or the homework and also to go over additional problems. These sessions are not required, but I think they will be really helpful. I am not planning to record these office hour sessions, so please attend if you can. Alex will also have weekly office hours that will run in a similar style.
3. **Discussion Sections:** Alex will run discussion sections on Zoom every Wednesday from 2:00-2:50PM. Discussion sessions are a very important part of this course. It is a good opportunity for you to practice working through problems on your own and in small groups.
4. **Exams:** There will be two midterm exams and one final exam. One of the big goals of this course is to prepare students for a high-stakes timed algebra exam (the Comprehensive and Qualifying Exams). I feel that the best way to prepare for this kind of exam is to take some timed algebra exams. These exams will be given online as Canvas quizzes. Exams will require Respondus LockDown Browser and use the Respondus Monitor proctoring system. I will give you more information about how this will work before the first midterm.
5. **Canvas Discussion Board:** We will be using the Discussion Board on Canvas to ask and answer questions about the course. If you have a question about something in the course you can ask a question about it on the discussion board. I will regularly check the board and will write in answers that everyone will be able to see. I have used the Canvas Discussion Board for courses in the past and thought it worked really well.

Course Expectations

I know that many of you have already taken a standard undergraduate course (or even two) in abstract algebra and a proof-based linear algebra course. Because of this, I plan to cover the basics rather quickly. In particular, **I am not planning to write down every detail of every proof during the lecture videos.** In order to be successful in this course, it will be necessary to do a significant amount of reading outside of class. The process of filling in the details of a proof is a big part of how you become comfortable with the material.

Students and faculty often have different expectations for advanced math courses. I highly recommend that you read this short document in order to better understand how I think about this course: <https://tinyurl.com/advancedmathcourseexpectations>

Textbook: *Abstract Algebra, Third Edition*, D. Dummit and R. Foote. ISBN: 978-0-471-4334-7

Secondary Reference: Expository notes on groups and rings by Keith Conrad:
<http://www.math.uconn.edu/~kconrad/blurbs/>.

Major Topics

In 206A we will focus mostly on group theory. In the last part of the course we will give an introduction to rings and ideals. My plan is to cover much of the material in Chapters 1-8 of Dummit and Foote. We will not discuss every section.

1. Introduction, Examples of Groups
2. Subgroups and Quotient Groups
3. The Isomorphism Theorems
4. Group Actions
5. Conjugacy in S_n and the Simplicity of A_n
6. Sylow's Theorem and Applications
7. Direct Products and Semidirect Products
8. Introduction to Rings and Ideals

Important Dates

- Friday, Oct. 30, 2:00-3:30PM: Midterm Exam 1.
- Monday, Nov. 23, 2:00-3:30PM: Midterm Exam 2.
- Thursday, Dec. 17th, 1:30-3:30PM: Final Exam.

Grading

- Weekly Homework: 30%
- Midterm 1: 15%
- Midterm 2: 15%
- Final Exam: 40%

Makeup Exams: Only in extreme circumstances will make-up exams be offered. If an emergency causes you to miss an exam, let me know as soon as possible. In such cases, I will most likely re-weight the later exams and/or final rather than offering a make-up exam.

If you would like to take an exam at a different time, please send me an email as soon as possible. For example, if the exam is at a time that does not work well for the time zone that you are in, I am happy to work with you to find a time that works better.

Homework

Weekly homework will be a big part of this course. The best way to become comfortable with a new and challenging subject is to do lots of problems. In particular, we will do many of the problems from recent UCI Comprehensive Exams and Qualifying Exams. You can find a large number of these exams here: <https://www.math.uci.edu/graduate/current-students/examinations>

I have always found that I think better about mathematics when I can discuss it with others and that I only really understand a problem when I can explain its solution to somebody else. You are strongly encouraged to work together on problem sets. I know that it may be harder to develop these kinds of study groups with the remote format, but I definitely recommend that you find a way to work together with others. I highly encourage you to solve problems together with others, but you should **write up your solutions individually**.

Dummit and Foote has a ton of great exercises and most of the homework will come from the textbook. I know that there are lots of documents online giving solutions to problems from the book. I'm not saying that you are not allowed to look at these, but if you use outside sources (other textbooks, websites, etc.) for your homework, you **must acknowledge them**. If you do not take the homework seriously (if you just copy solutions from a website), then you won't learn anything from it, and it will be much more difficult to do well on the exams.

Homework will generally be posted on Wednesday mornings and due the following Friday (9 days later) by 12PM.

Starting with Homework #2, assignments are required to be typed in LaTeX. I understand that not all of you are comfortable using LaTeX, maybe some of you have never used it before at all. Alex has put together some materials to help you become comfortable writing math in LaTeX and is available to help you with any questions that you have.

Additional Information

Academic Honesty: Cases of academic dishonesty can have very serious consequences. We will adhere to the university's academic honesty policy. For more information see: <https://aisc.uci.edu/students/academic-integrity/index.php>.

Accommodation Policies: If you need an accommodation to participate in this course, please email me no later than the end of the second week of class. Review the policies on accommodation at: <http://disability.uci.edu/>.

Resources for Remote Learning: The UCI Division of Teaching and Learning has set up a helpful website *Learn Anywhere*: <https://sites.uci.edu/learnanywhere>. This site has resources to help you get started with issues related to online courses. Please check out the UCI Remote Student Success Guide on that page.