Math 321: Foundations of Abstract Algebra
Fall 2016

Basic Course Information

Instructor: Prof. Jen Paulhus
Time and Location: MWF 2:00- 2:50 PM in 2245 Noyce Science Center
Office Hours: M: 1-1:50 PM, T: 1:30-2:50 PM, R: 10-10:50 AM, F: 10-10:50 AM
Office: 2519 Noyce Science Center
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webpage: `http://www.math.grinnell.edu/~paulhusj/teaching/ma321f16.html`

Text:*Abstract Algebra: A First Course, Second Edition*, Dan Saracino
Material Covered: We will cover much of the material in Chapters 1-21. I will assume you are familiar with the material in Chapter 0.
Other Sources: On reserve in the Kistle Science Library are five other books.
Algebra by Artin
Abstract Algebra by Beachy and Blair
A Book of Abstract Algebra by Pinter (applications)
Abstract Algebra by Dummit and Foote (graduate level)
How to Think Like a Mathematician by Houston
Online at `http://abstract.ups.edu/` you can find a copy of
Abstract Algebra: Theory and Applications by Tom Judson

What is Algebra?

Abstract algebra is one of the fundamental branches of modern mathematics. While it has its roots as far back as the late 1700's, it first came to prominence in the early 1900's. There are many current active areas of research in algebra, and the underpinnings of internet security come from algebra. This course will introduce you to several of the primary object of study in the subject: groups, rings, and fields.

Learning Goals

By the end of this course, you should have a much better sense of what the advanced mathematics field of abstract algebra entails. Even if your life goals do not involve further mathematical study, many of the skills you will learn translate to other fields.

This course is designed to aid you in several explicit learning goals. By the end of the semester, a student who is successful in this course will

- master the building blocks of modern algebra: groups, rings, and fields,
- learn how to use these tools to solve deeper mathematical problems,
- and develop a more sophisticated writing style.

Growth toward these goals will be measured by the student's ability to recall precise definitions and theorems, solve increasingly difficult homework problems, solve new, never before seen, problems during exams, write complete solutions with style, and articulate the conceptual ideas of the class.

Grading Policies

Homework: Homework assignments will be due *at the beginning* of class on Fridays. However, if you LaTeX your assignment (and you are in class that day), you may submit the assignment before 7 PM on PWeb without being considered late. Assignments will be posted on PWeb. No late homework will be accepted but I will drop your lowest homework score. The grading rubrics for homework, along with some suggestions on good mathematical writing, may be found on PWeb. Homework is 25% of your grade.

Exams: There will be two in-class exams, on **Monday, October 3** and **Wednesday, November 16**. The exams will be closed books, closed notes, etc. No makeup exams will be given unless agreed to beforehand so contact me immediately if you have any conflict with an exam. The two exams will be 18% each.

Final: There will be a cumulative final which will count for 34% of your grade. The final exam is **Thursday, December 15** from 2:00 PM - 5:00 PM. Do not make plans to go home early.

Participation: Participation (in class or in office hours) will be 5% of your grade.

MASSS: The department has a student seminar series which runs many Tuesdays at 11 AM. I will give bonus credit up to $\frac{1}{4}$ of a point on your final grade if you attend at least 4 of these talks and, for each one, send me a paragraph by 5 PM on the Friday immediately following it describing what the talk was about and a new mathematical concept you learned from the talk

Solutions for the homeworks and your grades will be posted on the course's PWeb page.

Other Class Policies

At least one day before each class, I will post a list of definition(s) we will cover. You should find those definitions in the book and write them in your notes *before* class. This serves two purposes. (1) Reading math before the lecture greatly improves understanding the lecture and (2) I will not spend precious class time copying definitions onto the board.

Your final grade in this course will reflect your performance throughout the whole semester. Except for a possible bonus question on the exams and an occasional challenge homework problem, there will be no extra credit and you cannot retake an exam nor redo homework.

Cell phone usage is strictly prohibited during class. I typically do not allow laptops or tablets in class, but if you would like to take notes on such a device, come talk to me.

Please show up on time, please do not leave in the middle of class unless it is an emergency, and please keep conversations among yourselves during class to an absolute minimum.

Grinnell College makes reasonable accommodations for students with documented disabilities. Students need to provide documentation to the Coordinator for Disability Resources, Autumn Wilke, located on the 3rd floor of the Rosenfield Center (x3702) and discuss your needs with her. Students should then speak with me as early as possible in the semester so we can discuss ways to ensure your full participation in the course, and coordinate your accommodations.

Academic Honesty
Make sure you are familiar with the college's guidelines for academic honesty which you can find here: `http://catalog.grinnell.edu/content.php?catoid=12&navoid=2537#Honesty_in_Academic_Work`
My policies and guidelines may be found on the homework rubric. There are very serious consequences if you are found to be in violation of one of these policies. A typical first offense is a zero on the particular assignment, your final grade in the course is dropped a full letter grade, and you are ineligible to receive honors from any department.

Workload
The time students spend on this course outside of class varies depending on many factors. As this is a 300 level course, and a core course in our major, 10 or more hours beyond class is quite typical.

Success In My Classes

Students come to this class with very different backgrounds, skills, and experiences. Usually the most successful students in my class have two things in common: they work hard and effectively, and they are able to self-reflect honestly and then make adjustments to their behaviors accordingly.

Unsolicited Advice

Take ownership of your education.

One major goal of the class is to teach you how to think about and explain the ideas of algebra like a pro. Like any new subject, this requires learning the language we use and the conventions for explaining our work. The best way to do this is to practice, practice, practice.

Read ahead in the material. A list of planned topics for future classes will be on PWeb.

Most of you will be challenged during the semester. Be prepared to not "get" everything right away.

It can be beneficial to discuss the material in this course with your classmates but be sure to spend some time alone wrestling with the material.