Introduction to abstract algebra – Math 412
University of Hawai'i at Mānoa
Fall 2019

Meetings: TTh 9:00am–10:15am, Keller 414

Lecturer: Robert Harron

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Office Hours	Tues. 1:30pm–2:30pm
	Thurs. 11:45am–12:45pm

Course website: http://math.hawaii.edu/~rharron/teaching/math412f19/

Textbook: Thomas Hungerford's *Abstract algebra, an introduction, Third edition*

Official description: Introduction to basic algebraic structures. Groups, finite groups, abelian groups, rings, integral domains, fields, factorization, polynomial rings, field extensions, quotient fields. Emphasis on writing instruction. (These topics are covered in the year sequence 412–413.) Pre: 311 and 321; or consent.

Unofficial description: Abstract algebra is the study of the structures that arise from algebraic operations. What? Well, for instance, we will study sets that have operations of addition and multiplication that obey the kinds of properties that usual addition and multiplication of integers obey. This abstraction leads to studying more general number systems that arise in the solutions of problems that don't originally involve such abstraction (for instance, the complex numbers are a natural setting for the study of electronic circuits). In addition to becoming comfortable with the meaning and use of the concepts and objects introduced in this course, our goal will also be to get you comfortable proving things about them. As this course is designated as a Writing Intensive course, there will also be an emphasis in writing proofs in proper 'Mathematical English', i.e. not just putting a bunch of symbols down on a page and saying that's the proof. This semester, we will get through the material in chapters 1–7 of the textbook.

Grading scheme:

Homework	50%	Midterm	20%	Final	30%

Homework: There will be weekly assignments. Problems will be posted after each lecture, then bundled together and due at a specified time each week. For instance, the first assignment will be due Thursday, Sept. 5th; Part 1 will be posted on the first day of class, and Part 2 will be posted on the second day of class. The assignments will be posted as pdf files on the course website containing lists of problems from the textbook and some problems that I've written out. It is therefore important that you have access to a copy of the correct edition (the 3rd edition) of the textbook.

This is a 'Writing Intensive' course; accordingly, there will be a few questions per assignment marked (WI) for which you will be expected to write out your solutions clearly and precisely in the style of 'Mathematical English'. In order to get full credit on these problems, your solution must be both mathematically correct and written appropriately. I will comment on your writing and return your WI solutions for rewrites. You will have a week to resubmit a WI problem you lost points on from the date I hand the assignments back in class.[1] There will also be other questions on the assignment that are not designated WI; some of these may also be graded, but there are no rewrites for them.

The work you submit should be well-presented (whether or not the question has a WI designation). Aside from the obvious consequence that I will be able to better read and understand what you are trying to say, it will also bring an added layer of critical thought to your work as writing up an argument you?ve already worked out on a separate piece of paper encourages you to process those thoughts over again and can frequently advance your understanding. If you're interested in writing up your assignments in LaTeX, I also provide the tex files and a tex preamble file on the course website. You are more than welcome to submit your work in handwritten form instead, though again it should be well-presented.

I've also prepared a sample to illustrate what I mean by 'Mathematical English'. You will find it on the course website in the course material section (right after a pdf copy of this syllabus).

Exams: There will be one midterm (take-home) and a final during the usual exam period (Tues., Dec. 17, 9:45am–11:45am).

Remarks:

- Reading ahead in the book is a simple way to keep up with class. Even if you don't understand as you're reading, the feeling of familiarity during the lecture will be helpful. Still, try to see if you can understand, or work out some of the examples.
- If you're struggling with some part of the assignment, you should come to my office hours or send me an email with what is stymying you. Or more generally if the course material is getting away from you, you should stop by and talk to me about it. The material in this course is challenging, but you can rise to that challenge.

[1] Note that in order to be allowed to rewrite your solution you have to have 'written' it in the first place. You don't get a rewrite on for problem you didn't turn in. Instead, it must be clear that you made an actual attempt the first time around.