

## Syllabus for Math 321, Fall 2016

<b>Class times and rooms:</b>	1:30-2:20, Keller 403.
<b>Instructor:</b>	Rufus Willett.
<b>Office:</b>	Physical Science Building 410.
<b>Office hours:</b>	M 11-12, T 1:30-3, R 11-12 (or other times by appointment).
<b>Email:</b>	<a href="mailto:rufus@math.hawaii.edu">rufus@math.hawaii.edu</a> .
<b>Textbook:</b>	Velleman, <i>How to prove it</i> , 2 <sup>nd</sup> edition.

### *Prerequisites*

Math 243 or 253A (or concurrent), or consent.

### *Course description*

The aim of this course is to introduce to the language and techniques of advanced mathematics. There are two main aspects of this:

- Mathematical arguments. This means producing and understanding *proofs*, as well as what constitutes an example or counterexample. Mathematicians prove things for several reasons. Two of the most important of these are:
  - It's how we check our ideas are correct, and how we convince other mathematicians of this.
  - Going through the process of a proof often helps us understand the underlying ideas better, and how they connect to things we already know.

We will discuss commonly used methods of proof such as *proof by contradiction*, *proof by induction*, ... and have lots of practice at producing and recognizing correct proofs.

- Language. We will introduce and work with some topics that are basic to advanced mathematics, for example: functions, sets, relations, equivalence relations, cardinality. You will have seen some of these things before, but we will approach them in a more rigorous way that helps us understand them better, and becomes important in later courses.

In terms of the text, we will aim to cover most of the material in the book, time permitting.

As well as the ideas above, this is a writing intensive course, and we will focus a lot on learning to write clear and correct mathematics.

## *Homework*

There will be roughly one homework set every two weeks, set on Wednesday: see the exact list at the end of this syllabus. Homework is due in class on Wednesday two weeks after it is set. Each homework will cover roughly the material from class up to, and a little after, the time it is set.

This is a writing intensive course, so you will be graded both on the correctness of your solutions, and also on the quality of your writing. You will get the graded homework back in class on the Friday after it is due. At this point, you will have until the next Wednesday (five days) to do corrections for 2/3 of the original credit. You may only do corrections on problems that you have made a 'reasonable' first attempt at, so please try to do everything the first time around!

You are strongly encouraged to start the homework early, and to come to me if you have any questions.

There will be 6 homeworks worth 30 points each throughout the semester, for a total of 180 points.

## *In class exercises*

We will do exercises at the end of most class during the semester, starting in the second week. Sometimes classes will not have an in class exercise, if we do not have time, or the topic is unsuitable. This is to give you an opportunity to practice course material shortly after it is introduced to make sure everyone has the basic idea. These exercises are not a test! You are encouraged to discuss them with other students, and with me.

I will grade the in class exercises (focusing partly on correctness, and partly on how your solution is expressed), and return them the class after they are set.

Each in class exercise will be worth 2 points. I will drop the lowest three scores you get for a total of 60 points (it probably will not work out to exactly 60, but I'll rescale it).

## *Midterm and final exam*

There will be one in-class midterm on Friday October 13th worth 60 points. There will be a cumulative final covering the entire semester, worth 100 points. The final will be in the same room as the classes, and will take place from 12:00 noon to 2pm on Tuesday December 17th (see [http://manoa.hawaii.edu/records/final\\_exam/spring\\_2013.html](http://manoa.hawaii.edu/records/final_exam/spring_2013.html) for final exam schedules).

### *Help outside of class*

You are **very very** strongly encouraged to email me or come to see me in office hours (see the top of the syllabus for times) if you have any questions about homework or material you don't understand. I will try to respond within 24 hours (and usually much more quickly) to emailed questions.

If you can't make the times of office hours, then I'm happy to make appointments for alternative times: please speak to me after class, or email me ([rufus@math.hawaii.edu](mailto:rufus@math.hawaii.edu)), to set up an appointment.

The Counseling and Student Development Center (<http://manoa.hawaii.edu/counseling/> or (808) 956-7927) can be contacted for counseling and mental health issues.

### *Late policies*

If you know you will not be in class for a deadline, I will accept homework early. I will also accept emailed homework (either typed, or scanned). **I will not accept late homework**, other than in very exceptional circumstances.

### *Grade breakdown and grade cutoffs*

Homework	180
In class	60
Midterm	60
Final	100
<b>Total</b>	<b>400</b>

Grades will be assigned roughly as follows (with pluses or minuses as appropriate). Grade boundaries may go down; they will not go up.

A	$\geq 90\%$
B	75%-90%
C	60%-75%
D	45%-60% .

### *Important dates*

Date	Event
Wednesday 8/29	Fall registration change period ends.
Wednesday 8/31	Homework 1 set.
Monday 9/5	Holiday: Labor Day.
Wednesday 9/14	Homework 1 due and homework 2 set.
Wednesday 9/21	Homework 1 corrections due.
Wednesday 9/28	Homework 2 due and homework 3 set.
Wednesday 10/5	Homework 2 corrections due.
Wednesday 10/12	Homework 3 due.
Friday 10/14	Midterm.
Wednesday 10/19	Homework 4 set.
Friday 10/21	Last day to withdraw.
Wednesday 10/26	Homework 3 corrections due.
Wednesday 11/2	Homework 4 due and homework 5 set.
Wednesday 11/9	Homework 4 corrections due.
Tuesday 11/8	Holiday: Election Day.
Friday 11/11	Holiday: Veterans' Day.
Wednesday 11/16	Homework 5 due and homework 6 set.
Wednesday 11/23	Homework 5 corrections due.
Friday 11/24	Holiday: Thanksgiving.
Friday 11/25	No class: Thanksgiving.
Wednesday 11/28	Homework 6 due.
Wednesday 12/7	Homework 6 corrections due.
Thursday 8/12	Last day of instruction.
Monday 12/12	Final exam 2:15-4:15.