

MATH 109: Introduction to Mathematical Reasoning (Spring 2011)

1 Administrivia

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Course website: <http://www.math.ucsd.edu/~minnes/109>

2 Course description

From the Catalog: This course uses a variety of topics in mathematics to introduce the students to rigorous mathematical proof, emphasizing quantifiers, induction, negation, proof by contradiction, naive set theory, equivalence relations and epsilon-delta proofs. Required of all departmental majors. Prerequisite: Math. 20F or Math 31AH or consent of instructor.

This quarter, we will cover most of the material in the Eccles textbook. This includes an introduction to the formal language of mathematics and proof techniques. Then, we will briefly venture into applications of these techniques in some of the main branches of mathematics: analysis, algebra, combinatorics, and number theory.

3 Course format

Lectures: MWF 1:00PM-1:50pm, Peterson 104.

Discussion sections: Thursdays SOLIS 111.

You are strongly encouraged to attend all lectures and discussion sections, and to raise any additional questions at office hours. The material in this course is challenging but rewarding. Make sure you give yourself every opportunity to learn it well.

Textbook: Peter J. Eccles, “An Introduction to Mathematical Reasoning”.

I highly recommend reading the textbook in addition to attending lectures. Seeing abstract concepts presented in several different ways is one of the best ways to help yourself understand them. Also, reading proofs written out formally will help develop your own proof-writing skills.

Schedule: A preliminary calendar of lectures and associated readings is posted on the course website. It will be updated as necessary.

Homework: The best (and only) way to learn mathematics is by doing it. In this course, you will be learning new mathematical concepts, and will also be developing new mathematical language tools. So, there will be two kinds of homework.

- *Homework exercises* will be due weekly and will be relatively quick exercises to increase your familiarity with the concepts covered in the class. The assignments are posted on the course website; check often in case of updates. Each assignment will consist of five (5) questions and will be graded out of 25 points.

- *Long-form homework* will be due once every two weeks and will roughly correspond to the five major parts of the course. They will involve slightly longer investigations of key concepts, usually requiring some proof and some computation. One of the goals of these assignments is to help you develop your mathematical writing skills. To this end, these assignments **must be typed** (though you may choose to write out by hand any computations or tables/figures) in full sentences of grammatically correct English. Your exposition should be self-contained: include the problem statement and any definitions you require. The idea is that a fellow math major who isn't currently in the class should be able to pick up your work and understand both what you are trying to prove and how you proved it. The grading scheme for these assignments is available on the course website, along with a sample.

You are allowed and encouraged to work on the homework problems together. However, you must write up the solutions individually. Homework must be **neatly** written or typed up and **stapled** together. Homework must be handed in to the homework drop-off box on the sixth floor of AP&M by 5PM on the day it is due. No late homework will be accepted.

Exams: There will be an in-class midterm exam and a final exam. The exam dates are on the class website and on the list of important dates below.

You may not use any notes, books, or calculators during the exams. To prevent distraction and any appearance of cheating, all cell phones and similar electronic devices must be put away during exams.

Grading: Final grades in the course will be assigned according to the following approximate weighting.

Homework exercises: 10 %
Long-form homework: 15 %
Midterm exam: 25 %
Final exam: 50%

The homework grades will be calculated using your best 7 of 8 homework exercises and your best 4 of 5 long-form assignments.

4 Important Dates

Monday, **3/28** First lecture.
Monday, **4/4** First set of homework exercises due.
Friday, **4/8** First long-form homework due.
Friday, **4/22** Deadline to drop course without a W.
Friday, **5/6** Midterm exam.
Monday, **5/30** Memorial day holiday - no lecture.
Friday, **6/9** Final exam.

Note: always check the course website for the most up-to-date information on scheduling.