MATH 109: COURSE SYLLABUS

Subject: Mathematical proof.

Professor: Jonathan Novak, jinovak@ucsd.edu, APM 7157.

Prerequisites: Math 18 or Math 31AH, and Math 20C.

Expectations: Math 109 is a challenging upper division mathematics class. Students in Math 109 will be expected to spend considerable time and effort on self-directed study. You should budget at least two hours of study time for each hour of lecture. This expectation is not arbitrarily imposed by the instructor; rather, it is demanded by the subject, which requires active engagement and extensive reflection. Ideally, this will be a rewarding process driven by curiosity. Mass-distributed study aids such as practice tests and review problems will not be provided by the instructor, who will instead work to support self-directed scholarship and genuine understanding. This course will focus on the academic communication and development of ideas, and place the job of being a student in the hands of the student.


Topics: We will aim to discuss the following topics in the following order.

1. Infinitude of the primes (Chapter 1).
2. Bertrand’s postulate (Chapter 2).
3. Irrational numbers (Chapter 8).
4. Inequalities (Chapter 20).
5. Sets and functions (Chapter 19).
6. Fundamental Theorem of Algebra (Chapter 21).
7. Pigeon-hole and double counting (Chapter 27).
8. Finite sets (Chapter 29).
9. Lattice paths and determinants (Chapter 31).
10. Counting trees (Chapter 32).
11. Lines in the plane (Chapter 11).
12. Euler’s formula (Chapter 13).
13. Graph coloring (Chapter 38).
15. Probability (Chapter 44).

Teaching Assistants: TBD
Piazza: We will use Piazza as the primary method of electronic communication. Please refrain from using email, and instead post your questions to Piazza so that we can discuss them as a class. If absolutely necessary, it is possible to send private messages to Instructors on Piazza. The Piazza signup link is: piazza.com/ucsd/fall2018/math109e.

Course Webpage: www.math.ucsd.edu/~jinovak, click on the “Math 109” tab.

Lectures: MWF, 15:00-15:50, CENTR 105.

Discussion Sections: Every student is assigned to one of the following:
   - Section E01: Th. 18:00, APM 6402.
   - Section E02: Th. 19:00, APM 6402.
   - Section E03: Th. 20:00, APM 6402.

Office Hours: The office hours for the Professor and the TAs will be posted to Piazza.

Grading Scheme: 40% Problem Sets, 15% Midterm 1, 15% Midterm 2, 30% Final.

Problem Sets: Due Fridays at 16:00 in APM basement dropbox. No late submissions accepted, lowest score dropped.

Midterm Exams: 10/19/2018 and 11/16/2018, both in class. No makeup tests; the weight of a missed midterm will be shifted to the Final Exam. Bring a blue book to each test.

Final Exam: 12/14/2018, 15:00-18:00, location TBA. No scheduling flexibility. If you cannot sit for the exam at the announced time, you should not enroll in the course. Bring a blue book to the final exam.

Letter Grade Conversion: Your final grade will be a number $x$ between 0 and 100, which will be converted to a letter grade $L(x)$ as follows:

$$L(x) = \begin{cases} 
  A^+, & 90 \leq x \leq 100 \\
  A, & 80 \leq x < 90 \\
  B, & 70 \leq x < 80 \\
  C, & 60 \leq x < 70 \\
  D, & 50 \leq x < 60 \\
  F, & 0 \leq x < 50 
\end{cases}$$