Mathematics 202. Proving Things in Analysis *Fall 2010 Syllabus*

Professor: Robert Strain (strain at math.upenn.edu)
Course Web Page: `http://www.math.upenn.edu/~strain/10ma202/`

Class schedule: Lectures on TR @ 12 in DRL 4C2, attendance is *expected.*

Course Assistant: Jason Chase (jach at math.upenn.edu)
Lab schedule: (101) M 6:30 - 8:30 pm, (102) W 6:30 - 8:30 pm.

Brief course description: This is a freshmen seminar. From the registrar's course description: This course focuses on the creative side of mathematics, with an emphasis on *discovery, reasoning, proofs and effective communication* (...). Small class sizes permit an informal, discussion-type atmosphere, and often the entire class works together on a given problem. Homework is intended to be thought-provoking, rather than skill-sharpening.

Specific topics covered are listed on the back.

Homework: Weekly, posted on the course website. Collaboration between students is encouraged, but you must write your own solutions, understand them and give credit to your collaborators. (In other words, put a list of the students with whom you collaborated on your homework.)

Late homework will not be accepted.

The two lowest homework scores will be dropped.

Exams and Grade: Your final grade is based in large part on your level of participation in class and homework, and two take home midterm exams.

Take-home midterm: There will be two take-home midterm exams assigned during the course of the semester. *No collaboration.*

Evaluation: Your final grade will be based on the homework (1/2) and the take-home midterm exams (1/4, 1/4).

Reading: D'Angelo & West, "Mathematical Thinking: Problem-Solving and Proofs," second edition, Prentice-Hall. *Please order this book from, for instance, Amazon.com; it is not at the Penn bookstore. This text will also be on reserve at the Math/Physics/Astronomy Library in DRL.*

Topics to be covered (subject to change):

- The emphasis in this course is for sure the concept of "proof", and most importantly learning how to prove things in Analysis.
- In this pursuit, we will look for inspiration from various sources including the following chapers from D'Angelo & West:
- Chapter 1. Numbers, Sets, and Functions.
- Chapter 3. Induction.
- Chapter 4. Bijections and Cardinality.
- Chapter 7. Modular Arithmetic.
- Chapter 13. The Real Numbers.
- Chapter 14. Sequences and Series.
- Chapter 15. Continuous Functions.
- Chapter 16. Differentiation.
- Chapter 17. Integration.
- Chapter 18. The Complex Numbers *(if time permits)*.