

# Mathematics 74: Transition to Upper Division Mathematics

Fall 2006, UC Berkeley

**Instructor:** Scott Armstrong

**Email:** sarm@math.berkeley.edu (please include the character string “Math 74” in the subject line of any email you send me)

**Office:** 1064 Evans Hall. This is very likely to change sometime during the second week of classes.

**Class Meetings:** Mondays, Wednesdays, and Fridays, 3:10-4:00 in 70 Evans Hall.

**Office Hours:** TBA.

**Course Webpage:** <http://math.berkeley.edu/~sarm/math74>

**Required Text:** Antonella Cupillari, *The Nuts and Bolts of Proofs*, Academic Press, 3rd edition. It costs \$33 on amazon.com, and is available in the campus bookstore.

**Prerequisites:** None.

**Course Objectives:** The primary goal of this course is to teach you the skills necessary to communicate mathematics on a level that will enable you to succeed in upper division courses. The specific mathematical knowledge that you learn in the course will be less important to your future than developing *mathematical maturity*— that is, developing the mental habits of a mathematician.

This course will be much different than previous math courses you may have taken! In fact, your experience in previous math courses will probably do you no good at all, and some of the habits you may have acquired will be counterproductive. I encourage you to come begin this class with an open mind about what mathematics is, and how it should be studied.

**Course Content:** The course will begin with an introduction to elementary logic, quantifiers, and an overview of some common mathematical arguments. We will then study basic set theory, mathematical induction, and arithmetic, including the fundamental theorem of arithmetic, Euclid’s theorem, congruency, the chinese remainder theorem, and Fermat’s little theorem. Finally, as time permits, we will study some elementary inequalities, and few basic concepts in analysis.

<b>Grading:</b>	Homework/Quizzes	25%
	Midterm #1	10%
	Midterm #2	15%
	Midterm #3	15%
	Paper	10%
	Final Exam	25%

**Homework:** There will be roughly one homework assignment each week, to be turned in each Wednesday at the beginning of class. Homework assignments will be posted on the course webpage. Each homework assignment will consist of about six or seven problems, and each student should turn in an average of at least four problems per assignment. Each problem turned in will be graded as *correct* or *incorrect*, in other words, 0 or 1. The burden is on the student to provide complete proofs and explanations of all assertions— in

other words, even if you feel that you “really understood” a problem but nonetheless made a reasoning error in writing your solution, you will receive a “0”. Hopefully, this will teach you to be skeptical of your own work and to read and reread your writing so as to catch any mistakes before submitting the assignment. Read the homework guidelines, posted on the course webpage, for more on homework assignments.

**Quizzes:** Approximately once every week there will be a short (15 minutes) quiz. To encourage class attendance, I will usually *not* announce the quiz beforehand. Each quiz will be scored out of 20 points. Ten points will be given for turning in a blank quiz, but points may be deducted for incorrect answers, possibly resulting in a score of less than 10. There will be no make-up quizzes, but I will drop your two lowest quiz scores.

**Paper:** Later in the semester, there will be a short writing assignment in which each student will write a short expository paper on a specific topic that she finds interesting.

**Midterms:** The midterm exams will be 50 minute, in-class exams. The dates of the midterms will be posted on the webpage a couple weeks in advance.

**Final Exam:** The final exam will take place on Thursday, December 14, 2006, from 12:30-3:30 PM. The final will be longer and slightly more difficult than the midterms since you will have a full three hours. It will be comprehensive. In the case of a student doing very well on the final, I may choose to weigh that student’s final exam score more heavily when determining final grades.