# Real Analysis NSC336

**Credits:** 4
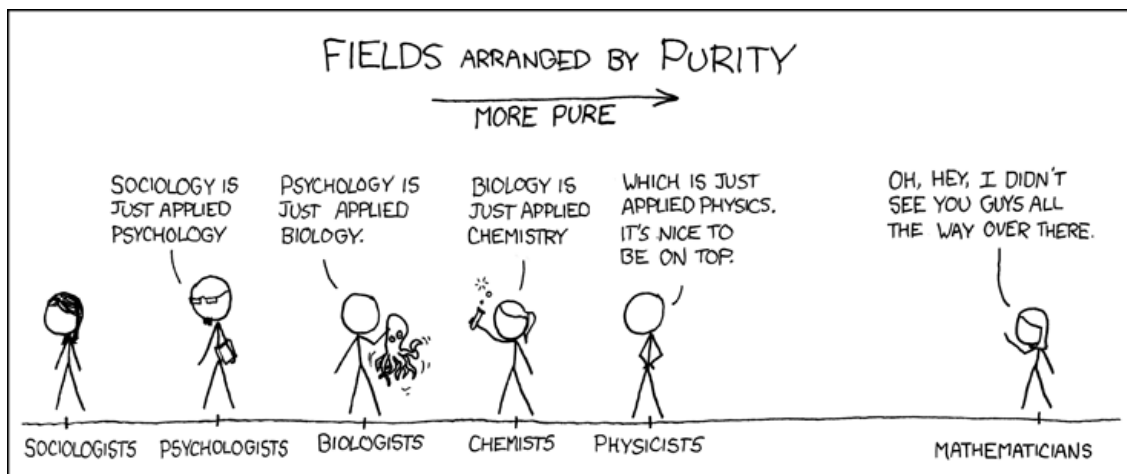**Level:** Advanced
**Prerequisite:** Calculus II or permission of instructor
**Location and Times:** Sci221 and rural Kenya, MW 9.00–10.20am
**Instructor:** Matt Ollis, matt@marlboro.edu
**Website:** http://cs.marlboro.edu/courses/fall2015/analysis/home

A comic strip from www.xkcd.com

## 1 Blurb

Mathematics is a vibrant field that has two-way connections with many other disciplines, so how did the stereotype in the above cartoon come about? Well, courses like this one for a start.

We'll be looking inward at the structure of mathematical objects and arguments with the dual aims of putting results about the real numbers and functions of real numbers on a sound theoretical footing and pushing the limits of the tools you know from calculus to see when they break down. Along the way we'll see many weird and wonderful objects that will test and, ultimately, improve our mathematical intuition.

Real Analysis, being the gateway into one of the three major branches of math (algebra and geometry are the other two), is a topic every math student must study. The skills of deductive and careful reasoning also stand students of other disciplines in good stead, and for this reason it is commonly considered to be a desirable course for prospective students to have taken by graduate schools in many scientific (both natural and social) fields.

We'll mostly work from Stephen Abbott's *Understanding Analysis* (2nd Edition). Typically, you will be expected to read from the book and come to class armed with questions about what you found difficult and attempts at some specific problems. We'll talk more

about this on Monday, but before then you should read the preface and Sections 1.1 and 1.2.

The preface will give you a good idea of the overall scope and attitude of the book (and also the course)—don't worry about the meanings of the various technical words, it's addressed at least in part to instructors. By December you'll understand it all! Section 1.1 gives a flavour of the types of question we'll be addressing in Chapter 1 (each chapter starts with such a taster). As with the preface, the idea now is not to understand the details (although carefully working through the proof of the irrationality of $\sqrt{2}$ will be time well spent).

Section 1.2 is where the need for detailed understanding starts. However, don't worry about this in the first instance—one of the first things we'll do on Monday is check in about the various levels you're all at and what you've seen previously (and what you've fully comprehended of what you've seen). Past experience with this course leads me to expect that few, if any, of you will have seen all of the "familiar territory" of this section and we'll probably spend a week just on this.

# 2    Grading

Your grade is determined as follows: 30% final exam; 40% homework assignments; 20% quizzes; 10% in-class problems. There will be three quizzes; your best two each contribute 10% to the grade. There will be 6–8 homework assignments over the course of the semester. Later ones might be more project-style and carry more weight. The final exam will be a 24-hour take-home open-book exam.

Attendance, class participation, and prompt submission of homework are expected. Your performance in these areas will influence your final result by up to one letter grade.

# 3    Academic Integrity

You are expected to be aware of the college's policy on academic integrity and to abide by it. It can be found on the college website, and is linked from the course website. Please come and talk to me if anything is unclear.