Instructor: Prof. Michael Thaddeus  
Office: Mathematics 414  
Classroom: Mathematics 203  
Lectures: M.W. 2:40–3:55 pm  
Office hours: F. 9:30–11:30 am, or by appointment.

Prerequisite: Honors Mathematics II, or a grade of 5 on the BC Calculus Advanced Placement examination, or another previous course in calculus, with the instructor’s permission.


Course description: This is a rigorous, accelerated course in calculus and linear algebra. We will aim to become comfortable with a rather abstract point of view, and experienced in understanding and constructing mathematical proofs. We will begin with a speedy review of calculus in one variable, concentrating on the theoretical aspects which are skipped in most first-year calculus courses. We will then proceed to study the algebra and calculus of functions in several real variables. Specifically, we will embark on the study of linear algebra, including determinants, orthogonality, and eigenvectors, toward the end of the fall term. The continuation of this course, Honors Mathematics IV, will conclude our study of linear algebra, and then deal with vector calculus, including the famous theorems of Green, Gauss, and Stokes.

You should expect to finish this course with a good grounding in basic real analysis and linear algebra, and some facility with the abstract ideas and methods of pure mathematics. To accomplish these goals, you will have to work considerably harder than you would in a normal calculus course. Indeed, each semester of this course is worth 4 points instead of the usual 3, and students who complete it need not take Linear Algebra, Mathematics V2010.

Course outline: Roughly, I expect to cover Apostol vol. I, chapters 1–5, parts of 6–7 and 11, and 15–16 in the fall; vol. II, chapters 3–5 and 8–12 in the spring.

Homework: To learn a subject like this one thoroughly, practical experience is essential, so a homework assignment will be given each week on Wednesday. You can learn as much from your fellow students as from lectures, so I encourage you to discuss the problems with each other, subject to the following ground rules: (1) make a serious effort to think through each question for yourself first; (2) list the names of all collaborators at the head of each assignment; (3) do not exchange any written work with others.

Homework is due on Friday at 5 pm the week after it is assigned, in my mailbox near the front door of Mathematics. The use of a staple or paper clip and the submission of all problems together (not piecemeal) is absolutely, positively, utterly compulsory. Late assignments will be penalized by 10% of their point value for each day they are late. There is one exception: 2 times during the fall semester, you may have an automatic 2 day extension (i.e. until Sunday at 5 pm). Mark your assignment “automatic extension.” Warning: the building may be locked outside of library hours.

Each homework assignment will also include some supplementary problems which are not to be handed in. You are expected to do these, but when you do them is up to you. For example, they might make good preparation the week before an exam.
**Reading:** Each homework assignment will include 40 to 50 pages of reading in Apostol. Most of this will duplicate the lectures, but be warned that not everything in the reading will be covered in the lectures, or vice versa. In principle, you are responsible for both.

**Recitation:** There will be a one hour recitation section each week, led by the teaching assistant, Morgan Sherman ⟨msherman@math.columbia.edu⟩, at a time to be arranged.

**Exams:** The midterm will be in class Wednesday, October 23. There will not normally be a makeup exam for the midterm; instead, you may be given an oral exam covering the same material. The final exam is scheduled for Wednesday, December 18, 1:10–4 pm. If you foresee conflicts, such as a religious holiday, with either exam let me know immediately. You can be excused from an exam only in a medical or family emergency, documented by a note from your doctor or dean. Also, please make your travel plans for the winter break early, as the date of the final exam cannot be moved.

**Grading:** Homework 40%, midterm 22%, final 38%.

**Help Room:** You may wish to take advantage of the Mathematics Help Rooms in 406 Mathematics and 333 Milbank. Teaching assistants are on call for much of the week to help you with any math problems you may experience. Schedules will be posted shortly: see ⟨www.math.columbia.edu⟩.

**Contacting me:** By e-mail at ⟨thaddeus@math.columbia.edu⟩, or, preferably, by telephone at 4–4308. Please come to office hours if at all possible, and try to avoid e-mail unless it is somewhat urgent.

**Lunch:** All are welcome at the bi-weekly Honors Math lunches, every other Wednesday at noon, for the time being at Ferris Booth Commons in Lerner Hall where you can spend your Dining Dollars.