Mathematics V1208y
Honors Mathematics B
Spring 2016

Instructor:	Prof. Michael Thaddeus	**Classroom:**	Mathematics 203
Office:	Mathematics 414	**Lectures:**	M.W. 4:10–5:25 pm
Office hours:	F. 10–12, or by app't.	**E-mail:**	mt324@columbia.edu

Course description: This is a rigorous, accelerated course in linear algebra and multivariable calculus. It is a continuation of Honors Mathematics A. As we did there, we will aim to become comfortable with a rather abstract point of view, and experienced in understanding and constructing mathematical proofs. Our study of linear algebra will cover linear independence, rank, determinants, orthogonality, and eigenvectors, culminating in the spectral theorem. We then turn to vector calculus, aiming for the famous theorems of Green, Gauss, and Stokes.

You should expect to finish this course with a good grounding in linear algebra and multivariable calculus, 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, this course is worth 4 points instead of the usual 3, and students who complete it need not take Linear Algebra, Mathematics V2010.

Required text: Tom M. Apostol, *Calculus*, volume II (Wiley). Reading and written assignments will be drawn from this text.

Course outline: The hope is to cover Apostol vol. II, chapters 1–5, 8, and 10–12.

Prerequisite: A passing grade in Honors Mathematics A, or the instructor's permission.

Assignments: To learn a subject like this one thoroughly, practical experience is essential, so a written assignment will be given each week. It will be posted on the course home page. 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) do not consult any online sources; (2) make a serious effort to think through each question for yourself first; (3) list the names of all collaborators at the head of each assignment; (4) do not exchange any written work with others; (5) write up every problem in your own words.

Assignments are due on Fridays at 5 pm in a collection box outside 417 Mathematics Hall. 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. Warning: the building may be locked outside of library hours.

Each 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 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.

Exams: The midterm will be in class Wednesday, March 9. 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 expected to be on Monday, May 9, 4:10–7 pm (date to be confirmed in April). If you foresee conflicts, such as a religious holiday or an introductory German exam, with either exam let me know immediately. You may 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 summer early, as the date of the final exam cannot be moved.

Grading: Assignments 40%, midterm 20%, final 40%.

Teaching assistants: The teaching assistants for the course are Jordan Keller ⟨keller@math.columbia.ed and Feiqi Jiang ⟨feiqi@math.columbia.edu⟩, who will grade the assignments. Both will hold office hours in the Help Room, 406 Mathematics Hall, at times to be arranged. But you may also seek help any time the Help Room is open: see ⟨http://www.math.columbia.edu/general-information/help-rooms/406-math/⟩.

Contacting me: By e-mail at ⟨thaddeus@math.columbia.edu⟩, or, preferably, by telephone at 4–4308. Even better, come to my office hours on Friday from 10 am to noon in 414 Mathematics, or knock on my door at any time.

Devices: Phones, laptops, tablets, and all other electronic devices (except watches) must be turned off and put away during all classes and exams.

Course home page: ⟨http://www.math.columbia.edu/~thaddeus/honors.html⟩.