Syllabus for Abstract Vector Spaces (Math 2406), Spring 2009

January 6, 2009

Instructor: Ernie Croot

Meeting Times: MWF 2:05 - 2:55.

Place: Skiles 243.

Office: Skiles 103.

Course Webpage: www.math.gatech.edu/∼ecroot/2406/2406.html

Office Hours: Tuesday 2:00-3:00 and Wednesday 3:00-4:00 (tentative)

Textbook: *Linear Algebra: A first course, with Applications to Differential Equations*, by Tom Apostol. Because the textbook does not cover all the topics I plan to discuss, I will hand out lecture notes on occasion (the book is good for the basics, but doesn't cover the heavier stuff at all).

Course grade: Your grade will be computed according to the following formula: You will have two midterms, each worth 20% of the grade; homework will be worth 30%; and the final will be worth 30%. The letter grade you receive will be based on the standard 60,70,80,90 plan (90 and higher is an A; 80 to 90 is a B; etc.).

When working your homeworks, if you do not turn them in on the due date, and do not provide a valid reason (e.g. medical, attend a funeral), you will get a grade of 0 for that homework. If you turn it in late on the due date (e.g. outside of class), I take no responsiblity for it being sent to the grader (i.e. you may not get a grade for the HW because it got lost on the way to the grader).

Outline of the content of the course: This course aims to rigorously treat the theory of vector spaces. You will be expected to produce and understand mathematical proofs of all the basic theorems from the text; indeed,

your exams will each have one or two proof problems, and the homeworks will include many exercises requiring you to provide proofs.

The basic topics that we will cover include the following, and possibly more, depending on the time we have: vectors, dot products, norms, matrices (and various theorems about them), vector spaces, bases, linear independence, linear transformations, the spectral theorem, the Rayleigh principle, orthogonal vectors, rational canonical forms, Cayley-Hamilton theorem, Jordan canonical forms, solutions to certain linear differential equations, Markov processes and chains.