Math 24 Spring 2006 – Linear Algebra, Honors Syllabus

Instructor: Rebecca Weber
Office: 412 Bradley Hall, 646-1720 (better to e-mail)
E-mail: Blitz, or rweber@math.dartmouth.edu
Webpage: `www.math.dartmouth.edu/~m24s06`
Office Hours: TBA

Graduate Instructor: Jonathan Bayless
Office: 1-H Bradley Hall, 646-2565
E-mail: Blitz

Course Meets: 10 hour, 10:00-11:05 MWF, Bradley 104
X-hour: Thursday 12:00-12:50
Tutorials Meet: TBA
Textbook: *Linear Algebra*, fourth edition, Friedberg, Insel, and Spence

General Information:

This course is directed primarily at the future math major, though anyone math-inclined who is interested in thinking abstractly is welcome. Linear algebra is one of the fundamental subjects of mathematics – I sometimes feel that a solid grasp of linear algebra will get you more than halfway to understanding many (most?) mathematics colloquium-style talks. We will discuss vector spaces, linear dependence and independence, linear transformations, matrices, determinants, eigenvalues and eigenvectors, and inner products.

There is an additional purpose to the class besides learning linear algebra, however. This is the class in which you make the transition from computational mathematics (such as most of calculus) to abstract mathematics. It is also the class in which you learn to write proofs. There is no way to accomplish these goals but by working with abstract concepts and engaging in proof-writing, so that we will do.

Course Organization:

The course will be primarily lecture-based. The textbook is really aimed at upper-level math majors or at least students who have had a more computational form of linear algebra already, so I will do my best to bridge the gap between where you are coming from and where the book expects you to be. We will occasionally use the X-hour for class; if there

seems to be a need we'll use it for an optional tutorial. Additionally you will have evening tutorial sessions with your graduate TA, Jonathan.

Attendance:

Attendance is optional but highly encouraged. At the beginning it is essentially mandatory because we will be covering some material which is not in the textbook. Throughout, I will be presenting the material in an organization not quite that of the book's, and since I write the exams, what I think is the "proper" way to think about this material is probably valuable information to you.

Assignments and Grading:

There will be weekly homework assignments, primarily out of the textbook, due on Fridays. Additionally, there will be weekly proof assignments, also due on Fridays, wherein you are given a statement and asked to come up with a proof. These proofs will be graded on a credit/no credit basis, with unlimited rewrites allowed, where credit is given for an essentially flawless proof (in both substance and form). I will be specific in my critique and expect it to be rare for more than one rewrite to be necessary.

There will be one midterm examination roughly halfway through class, and two quizzes, roughly one quarter and three quarters of the way through class. Your grade will be computed as follows:

Quizzes	50 pts	each
Midterm	100 pts	
Homework	100 pts	
Final Exam	200 pts	
Total	500 pts	

Please note I do not curve individual assignments. I begin with the ten percent scale (90% and up an A, 80% and up a B, etc.), and will only curve at the end, and only if a curve is necessary.

Help on Material

There are many ways to get help with the material. Here are some:

(1) Ask questions during, before, or after class.
(2) Discuss material with your classmates. I want everyone to write up their own homework, but feel free to discuss it with each other. However, while you may discuss the manner of proving the statements I give you, please do not discuss the way to write it up. I want you each to develop your writing skills independently.

(3) Attend tutorial. Jonathan will answer questions on homework as well as happily look at your proof write-ups and give you tips.
(4) Come to office hours to discuss questions. Office hours are nothing more than time put aside when I am guaranteed to be in my office free to meet with you. You do not need to make an appointment, nor feel bad about interrupting whatever I'm filling my time with when you come in.
(5) Make an appointment to meet with me. While I prefer this be done only in cases where the above options simply don't work out, or when the discussion is to be confidential, I am happy to meet with you at other times. The goal is for you to succeed in this class.

Notes on Proof Writing:

Let me try to go ahead and set out here some guidelines for writing proofs. These will bear little to no resemblance to the two-column proofs many of you met in high school geometry.

First of all, our proofs will be very verbal. It is frequently awkward to use symbols as abbreviations for the phrases often used in their stead when reading mathematics aloud. However, it can be clumsy and expand proofs out of readability to avoid symbols altogether. Striking this balance will be one of our goals.

Your audience is a person who is familiar with the underlying definitions used in the statement being proved, but not the statement itself. For instance, it could be yourself after you learned the definitions, but before you had begun work on the proof. Be careful about what you assume of the reader's ability to fill in gaps.

Cautionary notes: * If you have a definition before you of a particular concept and are asked to prove something about the concept, you must stick to the definition. * Be wary of mentally adding words like *only*, *for all*, *for every*, or *for some* which are not actually there. * The theorems I give you to prove will not have redundant hypotheses – that is, all the hypotheses must be true for us to assert that the conclusion is always true. Therefore you must use all of the hypotheses in the proof. [I may give you problems in homework asking to decide which hypotheses are redundant and which necessary.] * And finally, though this is indeed not English class, I will be checking your English. Small misspellings and the like will not be grounds for proof rejection, but sentence fragments and tortured grammar will be - make sure what your pronouns refer to is clear and that your verbs do not have confused objects.