

MATRIX ALGEBRA
MATH 322-03
SPRING 2009

Classroom: CB 341 Meeting Times: MWF 11:00am – 11:50am
Instructor: Katharine Ott Phone: 257-6815
Office: 733 POT email: katharine.ott@uky.edu
Office Hours: M 1:30pm – 3:30pm, W 10:00am – 11:00am, and by appointment
Course webpage: http://www.math.uky.edu/~kott/MA322_S09

Text: *Linear Algebra and its Applications*, 3rd ed., David C. Lay

Grading:

Homework	10%	A	90-100%
Proof of the Week	10%	B	80-89%
Quizzes	15%	C	70-79%
Exam 1	20%	D	60-69%
Exam 2	20%	E	Below 60%
Final Exam	25%		

Homework: Practicing problems is essential to learning and understanding mathematics. In my experience, students who practice problems *regularly* are more confident and commit fewer algebra mistakes. You will find a list of homework problems for each section at the end of this syllabus. While I will not be able to grade each of these problems, you are responsible for all of the homework exercises. I will collect your homework weekly on **Wednesdays** (quiz days) in class to check completeness and grade 1 – 2 problems per section. Graded problems will be announced in advance. You may ask questions about any homework problems in class or during office hours. I encourage you to work together on homework problems, however you must write up your own solutions. Homework will be graded on a scale of 1 – 10, with 5 points for completeness (more than 80% of the problems done) and 5 points for the graded problems. **Please write a list of the problems completed for each section at the top of your homework when you pass it in.**

Proof of the Week: Proofs are the foundation of mathematics and in this course I want every student to try their hand at writing mathematical proofs. Throughout the semester you will be responsible for **two** proofs of the week. We will pick numbers at the beginning of the semester representing the two weeks you will write a proof. When it is your week you will be required to submit a written proof of the mathematical statement that I have posted on the course webpage for the week. I realize that for many students this is the first experience at proof writing, so I wish for this

requirement to act as a gentle introduction. You may work with your classmates on the proof of the week, and I encourage you to show me your proof before passing it in so that we may discuss it. However, I do ask that each student turn in their own final proof when it is their turn. Each of the two proofs will be graded out of a possible 5 points, and in most cases I will allow re-writes. I hope that everyone can achieve full credit on this portion of the course! I will upload a correct proof each week on the course webpage so that the entire class will have a catalogue of proofs to refer to.



Quizzes: There will be a short quiz given in class every **Wednesday**. These quizzes will consist of 1 – 3 questions and you will have roughly 10 minutes to complete it. The questions will be very similar to the assigned homework problems. I will not allow any make-ups, except for approved absences (see 5.2.4.2 found at <http://www.uky.edu/StudentAffairs/Code>), but I will automatically drop your lowest two quiz grades at the end of the semester. Please include all of your work and make your final answer clear to me on the page. **No calculators will be allowed.**

“Math Culture” You may attend an extra-curricular math event during the semester and write a short summary in lieu of one quiz. This means I will drop your lowest *three* quiz grades. I will announce events as they approach, but they will include Math Club activities and Math Movies of the Month. These events will also be posted on our course webpage.

Exams: Two mid-term exams and a final exam are scheduled for this course. The mid-term exams will be given in class. Tentative dates can be found on the last page of this syllabus. I will announce the firm date of each exam at least a week in advance. Each of the mid-term exams will focus primarily on the material covered since the last examination, however you will be responsible for all of the course material up to that point. The final exam will be comprehensive. Note that **the final exam is scheduled for Friday, May 8, 1:00pm – 3:00pm**. As with quizzes, I expect you to include all of your work and make your final answer clear. No calculators will be allowed.

Class Conduct:

- I encourage and expect you to be vocal in class. Please ask questions as soon as they arise.
- Please be respectful of me and your classmates while in class or office hours. This includes turning off your cell phone and listening when others are speaking.
- Cheating on homework, quizzes or exams will not be tolerated. You are expected to follow the academic integrity standards stated in the University Senate Rules (see Chapter 6, <http://www.uky.edu/USC/New/SenateRules.htm>).
- Any student requiring special class or testing accommodations should provide the correct documentation to me as soon as possible.

Class Webpage: The course webpage will be updated regularly with class announcements, copies and answers to past quizzes, and the Proof of the Week. You will also find a copy of the class syllabus and my contact information on the page, as well as a Google Calendar for our class. This calendar will include dates of tests, quizzes, homework due dates as well as extra-curricular math events. I will also update the calendar with the homework problems due each week and what sections of the book are to be covered on the quiz. If you have a question regarding an assignment, you should refer to this calendar first.

Office Hours: I hold office hours for your benefit and I encourage you to take advantage of them. You do not need an appointment if you plan to attend regularly scheduled office hours. If you cannot make my posted hours I will be happy to set a meeting time that is convenient for the both of us.

Important Dates:

Wednesday	January 14	First day of classes
Monday	January 19	Academic Holiday
Wednesday	January 21	Last day to add a class
Wednesday	February 4	Last day to drop a class
Monday	March 9	Midterm of semester
Monday – Friday	March 16 – 20	Spring break
Friday	May 1	Last day of classes
Friday	May 8	Final Exam

Course Schedule and Homework Problems:

§	Section	Problems
1.1	Systems of Linear Equations	1,3,4,5,7,11,13,15,23,24,25
1.2	Row Reduction and Echelon Forms	1,3,7,9,11,17,19,21,23,25,27
1.3	Vector Equations	1,3,5,9,11,13,15,17,21,23,24
1.4	The Matrix Equation $Ax = b$	1,3,5,7,9,12,14,15,21,23,24,25
1.5	Solution Sets of Linear Systems	1,3,5,9,15,16,19,23,24,25,26
1.7	Linear Independence	1,3,5,7,9,11,13,15,17,21,22
1.8	Introduction to Linear Transformations	1,3,5,9,11,13,17,19,20,21,22,24,29
1.9	The Matrix of a Linear Transformation	1,3,5,7,9,17,23,24,29,30,35
2.1	Matrix Operations	1,2,3,4,5,6,9,10,11,13,15,16,23,27,30
2.2	The Inverse of a Matrix	1,3,5,7,9,10,11,13,22,29,31,33
2.3	Characterizations of Invertible Matrices	1,3,5,6,7,11,12,13,17,24,36,37
	EXAM 1	Wednesday, February 18 (tentative)
2.5	Matrix Factorizations	1,3,5,6,7,9,11,15,17,24
2.8	Subspaces of \mathbf{R}^n	1,2,5,6,7,9,10,15,16,21,23,24,25,27
2.9	Dimension and Rank	1,2,3,5,7,9,11,13,15,17,18,19
3.1	Introduction to Determinants	1,3,5,7,9,11,15,19,21,22,23,25,27
3.2	Properties of Determinants	1,3,4,5,7,11,15,17,21,24,25,29,31,32
5.1	Eigenvectors and Eigenvalues	1,2,3,5,7,9,11,13,17,19,21,22,25,27
5.2	The Characteristic Equation	1,3,5,9,11,19,21,22,25
5.3	Diagonalization	1,2,3,5,7,11,17,21,22,24,27,28
6.1	Inner Product, Length, and Orthogonality	1–8,9,10,11,13,16,17,19,21,23,24,25,27,28
6.2	Orthogonal Sets	1,3,5,7–11,13,15,16,17– 20,21,23,24,26,27,29,32,33
	EXAM 2	Wednesday, April 1 (tentative)
6.3	Orthogonal Projections	1,3,5,7,9,11,12,15,17,19,21,22,23
6.4	The Gram-Schmidt Process	1–4,7,9,11,13,15,17,19,20
6.5	Least-Squares Problems	1–5,7,9,11,13,15,17,19
4.1	Vector Spaces and Subspaces	1,3,5,6,7,8,9,10,13,14,23,24,35,36
4.2	Null Spaces, Column Spaces and Linear Transformations	1,3,5,7,13,15,17,23,25,26,29,30,31,33,34,35
4.3	Linearly Independent Sets; Bases	1,3,5,9,10,12,13,15,19,21,22,23,29,31,32,33
4.4	Coordinate Systems	1,3,4,5,7,9,10,11,13,14,15,16,17,18,21,22,27,29
4.5	The Dimension of a Vector Space	1,3,7,10,11,13,15,16,17,19,20,21,25,29
4.6	Rank	1,2,3,4,5,7,9,13,17,18
	FINAL EXAM	Friday, May 8 (fixed)