LINEAR ALGEBRA

MATH 2700.006

FALL 2013

Instructor: Dr. J. Iaia
Office: GAB 420
Office Hours: MW 10-12, or by appt.
webpage: http://www.math.unt.edu/faculty-page-joe-iaia

Time: MWF 9:00-9:50
Place: MATT 117
email: iaia@unt.edu

Text: David Lay, *Linear Algebra and its Applications, 4th ed*

Prerequisite: Math 1720 - Calculus 2

GRADING POLICY

Exam 1	*Sept.* 20	20%	
Exam 2	*Oct.* 18	20%	
Exam 3	*Nov.* 15	20%	
Final	*Dec.* 11	20%	8am-10pm
Homework	*weekly*	20%	

Exams: Exams **must** be taken on the dates listed above. Exceptions will be considered *only* if one has **written documentation** certifying one's absence.

Homework: Homework will be assigned each class and collected weekly. Five problems will be chosen at random and graded. Homework is extremely important and students are highly encouraged to spend a lot of time working on the homework problems.

Attendance: **Students are responsible** for **all** work assigned and announcements made during any absence.

Code of Conduct: Students are expected to be *respectful of others* at all times. This includes keeping talk and other noise to a minimum while a lecture is in progress or an exam is being taken. Any student being disruptive may be dismissed from the class meeting. **Cheating** will **not** be tolerated and anyone found guilty of cheating may receive an F for the semester.

The **Student Evaluation of Teaching Effectiveness (SETE)** is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in feedback from students, as I work to continually improve my teaching. I consider the SETE to be an important part of your participation in this class.

Students with disabilities: It is the responsibility of students with disabilities to provide the instructor with appropriate documentation from the Dean of Students Office.

Semester grades are determined by averaging the grades on the 3 exams, the final exam, and the homework. Letter grades will be based on this average and will follow this scheme: **A 90- ;B 80-89; C 70-79; D 60-69; F -59**

Course Description

As you might guess from the title, Linear Algebra is all about studying linear equations and linear operators. I once had a professor in graduate school who said that mathematicians understand how to do two things - calculus and linear algebra. Hopefully you know the basics from calculus so we will now start with that other topic that mathematicians understand. We will first study systems of linear equations which will lead to a discussion of matrices and matrix equations. This then leads to a discussion of linear transformations and finding the matrix associated with a linear transformation. Along the way we will have to learn about vectors and what it means for a set of vectors to be linearly independent and what the span of a set of vectors is. This will lead to the topics of vector spaces, subspaces, bases of a vector space, and dimension. We will also discuss the determinant of a matrix, eigenvectors, and eigenvalues.

Course Objectives

At the end of this course, students should know how to solve a system of linear equations, know what a matrix is and how to row reduce a matrix to echelon form and/or reduced echelon form. Students should also know how to find the inverse of a matrix, the determinant of a matrix as well as Cramer's rule. Students should also know how to determine if a set is a vector space and how to find a basis of a vector space and find the dimension of a vector space. In addition, students should know how to find the matrix representation of a vector space with respect to a particular basis as well as the eigenvectors and eigenvalues of a matrix. Students should also know sufficient conditions for a matrix to be diagonalizable.

Course Outline

Meeting 1: systems of linear equations

Meeting 2: row reduction and echelon forms

Meeting 3: vectors

Meeting 4: linear independence

Meeting 5: linear transformations

Meeting 6: the matrix of a linear transformation

Meeting 7: matrix operations, matrix multiplication

Meeting 8: the inverse of a matrix

Meeting 9: characterization of invertible matrices

Meeting 10: review for exam 1

Meeting 11: exam 1

Meeting 12: subspaces

Meeting 13: the span of a set of vectors; null space

Meeting 14: basis for a subspace

Meeting 15: dimension and rank

Meeting 16: determinants

Meeting 17: properties of determinants

Meeting 18: Cramer's rule

Meeting 19: area, volume, and determinants

Meeting 20: review for exam 2

Meeting 21: exam 2

Meeting 22: vector spaces

Meeting 23: null space and column space of a linear transformation

Meeting 24: dimension

Meeting 25: rank

Meeting 26: change of basis

Meeting 27: eigenvectors and eigenvalues

Meeting 28: the characteristic equation

Meeting 29: diagonalization of matrices

Meeting 30: review for exam 3

Meeting 31: exam 3

Meeting 32: complex eigenvalues

Meeting 33: applications to differential equations

Meeting 34: inner products and orthogonality

Meeting 35: orthogonal projections

Meeting 36: the Gram-Schmidt process

Meeting 37: diagonalization of symmetric matrices

Meeting 38: more about diagonalization of symmetric matrices

Meeting 39: review for final exam

Meeting 40: review for final exam

Meeting 41: final exam