ELEMENTARY LINEAR ALGEBRA

The University of Toledo
Mathematics & Statistics Department, College of Natural Sciences and Mathematics
MATH1890-0XX, CRN XXXXX

Instructor:	(Insert Name]	Class Location:	(Insert Building/Room)
Email:	(Insert E-mail Address)	Class Day/Time:	(Insert Days/Time)
Office Hours:	(Insert Days/Time)	Lab Location:	(Insert Building/Office #, if applicable)
Office Location:	(Insert Building/Office Number)	Lab Day/Time:	(Insert Days/Time, if applicable)
Office Phone:	(Insert Phone Number)	Credit Hours:	3
Term:	(Insert Semester and Year)		

COURSE DESCRIPTION

MATH1890 is a first course in Linear Algebra at the undergraduate level. It begins by introducing students to the methods for solving linear systems of equations and the calculus of matrices. Building upon these topics the abstract notions of a vector space and linear transformations are introduced. The equivalence of matrices under similarity and conjugation is studied with the aid of the notions of inner product spaces and eigenvectors and eigenvalues.

STUDENT LEARNING OUTCOMES

The successful Linear Algebra students should be able to:

1. Vectors: Utilize algebraic and geometric representations of vectors in $\mathbb{R}^3$ and $\mathbb{R}^n$ their operations,

PREREQUISITES
Minimum grade of C in MATH 1840, or

the grading method uses a grading scale it should be clearly stated. In scheduling quizzes and exams it should be kept in mind that the last day to add/drop the class is the end of the second week of classes and the last day to withdraw from the class is the end of the tenth week. By these dates students like to have some measure of their progress in the class.

IMPORTANT DATES
*The instructor reserves the right to change the content of the course material if he perceives a need due to postponement of class caused by inclement weather, instructor illness, etc., or due to the pace of the course.

MIDTERM EXAM:

COURSE CONTENT:

Chapter 1 Linear Equations in Linear Algebra	(total 10 hours)
1.1 Systems of Linear Equations (2)	2 hour
1.2 Row Reduction and Echelon Forms (2)	1 hour
1.3 Vector Equations (1)	2 hour
1.4 The Matrix Equation Ax = b (2)	1 hour
1.5 Solution Sets of Linear Systems (2)	1 hour
1.7 Linear Independence (4)	1 hour
1.8 Introduction to Linear Transformations (5)	1 hour
1.9 The Matrix of a Linear Transformation (5)	1 hour
Chapter 2 Matrix Algebra	(total 8 hours)
2.1 Matrix Operations (3)	2 hour
2.2 The Inverse of a Matrix (3)	2 hour
2.3 Characterizations of Invertible Matrices (3)	1 hour
2.8 Subspaces of R^n (4)	2 hour
2.9 Dimension and Rank (4)	1 hour
Chapter 3 Determinants	(total 5 hours)
3.1 Introduction to Determinants (6)	1 hour
3.2 Properties of Determinants (6)	2 hour
3.3 Cramer's Rule, Volume, and Linear Transformations (6)	2 hour
Chapter 4 Vector Spaces	(total 9 hours)
4.1 Vector Spaces and Subspaces (8)	2 hour
4.2 Null Spaces, Column Spaces, and Linear Transformations (5)	2 hour
4.3 Linearly Independent Sets; Bases (4)	1 hour
4.4 Coordinate Systems (9)	1 hour
4.5 The Dimension of a Vector Space (4)	1 hour
4.6 Rank (4)	1 hour
4.7 Change of Basis (9)	1 hour
Chapter 5 Eigenvalues and Eigenvectors	(total 6 hours)
5.1 Eigenvectors and Eigenvalues (7)	1 hour
5.2 The Characteristic Equation (7)	1 hour
5.3 Diagonalization (7)	2 hour
5.4 Eigenvectors and Linear Transformations (7)	1 hour
5.5 Complex Eigenvalues (7)	1 hour
Chapter 6 Orthogonality and Least Squares	(total 2 hours)
6.1 Inner Product, Length, and Orthogonality (1)	1 hour
6.2 Orthogonal Sets (1)	1 hour
6.3 Orthogonal Projections	optional
6.4 The Gram-Schmidt Process	optional

Total : 40 hours lecture + 3 hours exams = 43 hours

*The numbers in parentheses refer to students outcomes and 1-8 are the essential outcomes.

*In Fall semesters there are 43 lecture for a MWF class.