COURSE INFORMATION FOR MATH 330
LINEAR ALGEBRA

Instructor Professor Jennifer Johnson-Leung
303 Brink Hall
jenfns@uidaho.edu

Class Times
MWF 12:30-1:20, TLC 122
Office Hours
Tentative: Monday 3:30-5, Friday 12:30-1:20 and by appointment

Text Lay Linear Algebra and its Applications Sixth Edition *with*
MyMathLab - Pearson

Course Description

Linear algebra is one of the most important parts of modern mathematics. In addition, its applications continue to spread more and more fields. The purpose of this course is to present the principal topics of linear algebra and to illustrate the power of this subject through a variety of applications.

This course is a transitional course, in which a mathematical argument and the construction of the proof are introduced. However, the focus is on student mastery of the techniques of linear algebra, which developed initially as efficient methods of solving linear systems of equations. We will discuss the following topics:

(1) Solution of linear systems by Gaussian elimination, including
- pivot positions and free variables
- reduced echelon form
- writing solution sets in parametric vector form
- relationship between solutions to a linear system and the related homogeneous system

(2) Basic matrix operations, including
- multiplication
- transpose
- inverse
- determinant

(3) Vector space concepts and linear transformations, including
- linear independence and linear dependence
- vector spans
- basis of a vector space, dimension
- coordinates of a vector space relative to a basis
- null space and column space
- rank of a matrix

- matrix of a linear transformation
- change of basis

(4) Eigenvalues and eigenvectors, including
- finding eigenvalues from the characteristic equation
- finding eigenspaces
- diagonalization

(5) Inner products, including
- orthogonal projections
- orthonormal basis

Grading Policies:

Homework: Homework exercises will be assigned in each class. MyMathLab assignments will be due at the next class period and written homework will be submitted approximately weekly. *Collaboration on homework is allowed and encouraged.* Late homework will not be accepted except in extenuating circumstances.

Attendance: Attendance is required and will be counted toward your final grade in the course.

Exams: There will be three midterm exams and a final exam. The class schedule will be posted on canvas. No credit will be given for missed examinations. Exception will be made for illness.

Collaboration: You are *encouraged* to collaborate on solving the problems given as homework. However, the solutions should be written on your own and in your own words. *Clearly, there is no collaboration on exams.*

Point Distribution:

- Written Homework - 10 points
- MyMathLab Homework - 10 points
- Attendance - 5 points
- Midterm Exams - 3 at 15 points each
- Final Exam - 30 points

Learning Outcomes for Math 330:

(1) The student will become better at reasoning with abstract ideas in a quantitative context. In particular, the student will learn to determine if particular examples satisfy a mathematical definition and to construct simple examples and non-examples to mathematical definitions.

(2) The student will understand and use standard linear algebra concepts, including vector spaces, subspaces, spanning sets, linear independence, basis, dimension, change of coordinates, standard matrix operations, null and column spaces of a matrix, rank, linear transformations, eigenvalues, eigenvectors, inner product spaces, and orthogonality. The student will understand and use the relationships between these concepts.

(3) The student will learn to perform the following procedures and understand why these procedures produce the desired answers:
   - Compute the solution set to a linear system by using Gaussian elimination to bring the augmented matrix to reduced echelon form, then using the reduced echelon form to write the solution set in parametric vector form.
   - Standard matrix operations including addition, multiplication, and finding the inverse.
   - Determine the eigenvalues of a matrix using the characteristic equation and find the eigenspace corresponding to a given eigenvalue.
   - Compute the coordinates of a vector and the matrix of a linear transformation with respect to different bases.
   - Generate an orthogonal basis for a given space.

(4) The student will improve their ability to communicate clearly, effectively, and in an organized fashion their reasoning, their understanding of concepts and their relationships to each other, and their understanding of procedures and their justification.

The remaining UI syllabus language on CETL's syllabus page should be considered as part of this document.