SOUTHERN UNIVERSITYAND A&M COLLEGE
DEPARTMENT OF MATHEMATICS

MATHEMATICS 233
INTRODUCTION TO LINEAR ALGEBRA

Catalogue Description: An introductory study of elementary matrix algebra, systems of
   linear equations, determinants, vector spaces, eigenvectors and eigenvalues and
   linear transformations.

Prerequisites: Mathematics 135 and 140. Math 233 may be taken concurrently with
   Math 264.

Required Textbook: Elementary Linear Algebra, Howard Anton, John Wiley & Sons,
   9th Edition, 2005.

Instructor:

Goals and Course Objectives: At the end of the semester, the student should be able to

1. Reduce a matrix to its row-reduced echelon form.
2. Solve system of linear equations using Gaussian Elimination and
    using Gauss- Jordan Elimination.
3. Identify the systems that are inconsistent.
4. Find solutions to consistent systems: unique solutions and parametric
    solutions.
5. Perform matrix operations: addition, subtraction, multiplication and matrix
    product.
6. Identify when a matrix is not invertible.
7. Find the inverse of a matrix, when it exists, using
    (a) row reduction
    (b) the formula for inverse (using $A^{-1}=adj(A)/det(A)$
8. Solve linear systems by
    (a) matrix inversion method.
    (b) Cramer's Rule.
9. Evaluate determinants using various methods:
    (a) determinant functions
    (b) row reduction
    (c) cofactor expansion
10. Evaluate determinants of products and powers of matrices.
11. Evaluate eigenvalues and eigenvectors.
12. Sketch vectors in 2-space and 3-space.
13. Find the dot product and cross product of two vectors
14. Find the angle between two vectors.

15. Calculate the orthogonal projection of a vector **u** on another vector **a**
16. Find the equations of lines and planes in 3-Space.
17. Find the distance between a point and a plane.
18. Find the standard matrix of a linear transformation and vice versa.
19. Identify Linear Transformations/standard matrices associated with reflection, orthogonal projection, rotation, contraction and dilation.
20. Determine whether a linear operator is one-to-one.
21. Find the inverse of a one-to-one linear operator.

Course Content:

Chapter 1: System of Linear Equations and Matrices.

1.1   Introduction to system of Linear Equations
1.2   Gaussian Elimination
1.3   Matrices and Matrix Operations
1.4   Elementary Matrices and Finding Inverse of Matrices.

Chapter 2: Determinants.

2.1   The Determinant Function.
2.2   Evaluating Determinants by Row Reduction
2.3   Properties of Determinant Function.
2.4   Cofactor Expansion.

Chapter 3: Vectors in 2-Spaces and 3-Spaces

3.1   Introduction to vectors (Geometric)
3.2   Norm of a vector
3.3   Dot Product; Projections
3.4   Cross Product
3.5   Lines and Planes in 3-Space

Chapter 4: Euclidean Vector Spaces

4.1   Euclidean n-Space
4.2   Linear Transformations from R^n to R^m
4.3   Properties - Linear Transformations from R^n to R^m

Grading: Course grade will be based on quizzes, homework assignments, three tests and a comprehensive final examination. Quizzes, attendance/classroom-participation and homework assignments are worth 100 points. Tests and the final examination are worth 100 points each. There will be no make up test for tests missed without prior permission.
          (Total possible points 500.)

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A:      450-500
B:      400-449
C:      350-399
D:      300-349
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Course Schedule:

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Test 1: Sections 1.1-1.4
Test 2: Sections 1.5, 1.6, 2.1-2.3
Test 3: Sections 2.4, 3.1-3.5
Final Exam: sections 1.1-1.6, 2.1-2.4, 3.1-3.5, 4.1-4.3
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Grading:

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89.0 – 100.0        A
79.0 --  88.9       B
69.0 --  78.9       C
58.0 --  68.9       D
Below   58.0        F
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Disability Statement: If you have a documented disability, then please discuss it with personnel at 771-3546 in Room 246 Blanks Hall. Learners, that are considered having a disability, are to provide the professor with a letter from Professor P. Hebert through the Office of Disability Service stating the appropriate accommodations required of this course.

Disclaimer: These activities and assignments are tentative. Changes may occur due to assessment of learners by the professor and due to the professor. It will be necessary for the learner to periodically review this course syllabus online via blackboard throughout the semester.