

**Fayetteville State University**  
**College of Arts and Sciences**  
**Department of Mathematics and Computer Science**  
**MATH251 Linear Algebra**  
**FALL 2010**

**I. Locator Information:**

**Instructor:** Dr. Mohammad Siddique

**Course # and Name:** MATH 251 Linear Algebra

**Office Location:** Lyons Science 307

**Semester Credit Hours:** 3

**Office Phone:** 910 672 2436

**Day, Time and Room Class Meets:** MWF 10:00 am –10:50 am, SBE 211

**Office Hours:** MF 8:45 am- 9:45 am, MW 1: 00 pm – 2:30 pm,

TR 9:00 am – 10:30 am or by Appointment

Total Contact Hours for Class:

**Email address** [msiddique@uncfsu.edu](mailto:msiddique@uncfsu.edu)

**In case FSU must close for an emergency during the semester, instruction will continue using Blackboard.**

**The following statement should appear on the first page of each course syllabus:**

**FSU Policy on Electronic Mail:** Fayetteville State University provides to each student, free of charge, an electronic mail account ([username@uncfsu.edu](mailto:username@uncfsu.edu)) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail. Rules and regulations governing the use of FSU email may be found at <http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf>

**II. Course Description:** This course provides a study of such topics as vectors, matrices, matrix operations, system of linear equations, Gauss-Jordan elimination, determinants, vector spaces and subspaces, linear independence, bases, linear transformations, rank and kernel, eigenvalues and eigenvectors, diagonalization, inner products, Euclidean spaces and Gram-Schmidt process. **Prerequisite:** MATH 130 or MATH 131 or consent of the department.

**III. Disabled Student Services:** In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ACA) of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1<sup>st</sup> Floor); 910-672-1203.

**IV. Textbook:** H. Anton, Ch. Rorres, Elementary Linear Algebra: Applications Version, 10<sup>th</sup> Ed., John Wiley & Sons,

**The textbook is required!**

**V. Student Learning Outcomes –**

- Upon completion of this course, students will be able to:
- Use matrices to solve linear systems
- Add and multiply matrices, find inverses, transposes, and evaluate determinants
- Apply Cramer's Rule
- Use the concepts of length, dot product, cross product and linear independence
- Solve geometric problems using vector space methods
- Represent linear transformations with matrices
- Use the concepts of vector spaces, vector basis and dimension
- Understand inner products of vectors and their applications.
- Understand eigenvalues and eigenvectors, and their applications.
- Understand the properties of complex vector spaces.

**VI. Course Requirements and Evaluation Criteria:**

**a. Grading Scale – Five homeworks (20 %) will be collected throughout the course. Five major tests (60 %) will be given at the completion of the chapters. The lowest test score will be dropped. A comprehensive final exam (20 %) will be given at the conclusion of the course. Grading scale is as follows:**

**A 90 - 100%, B 80 - 89%, C 70 - 79%, D 60 - 69%, F Below 60%**

**b. Attendance Requirements –** The FSU Attendance Policy stated on page 71 of the 2009-10 University

Catalogue will be strictly enforced. **Three (3) late arrivals** and/or early departures will count as one absence. Exceeding the limit of **four (4) unexcused absences** will result in an interim grade **EA = EXCESSIVE ABSENCES**. When a student enters the classroom after the roll call, it is the responsibility of the student to inform the instructor after class that (s)he was in attendance. You must notify the instructor when it is necessary for you to leave early.

c. Notice that:

**\_ Students receive no refund for withdrawing from individual classes and they slow their progress toward degree completion.**

**\_ Students who withdraw from or fail more than one-third of their classes will no longer be eligible for financial aid.**

**\_ STUDENTS MUST STRIVE TO EARN CREDIT FOR ALL THE CLASSES IN WHICH THEY ENROLL. STUDENTS SHOULD WITHDRAW FROM CLASSES ONLY WHEN IT IS ABSOLUTELY NECESSARY.**

**d.** No make up tests for unexcused absences! For excused absences student should contact the instructor **prior** to the test!

**e. Other** - Dishonesty on graded assignments will not be tolerated. Students must neither give nor receive help on any work to be graded. The University policy on cheating will be applied to any violations. The minimum penalty will be a grade of zero on the assignment (including tests).

**VII. Academic Support Resources** –Use of SI, Smarthinking, University College Learning Center

### **VIII. Course Outline and Assignment Schedule**

This schedule is subject to change for the optimum benefit of the class as a whole. Therefore, it is important to stay alert and attend class regularly.

#### **Chapter 1**

##### SYSTEMS OF LINEAR EQUATIONS AND MATRICES

- 1.1 Introduction to Systems of Linear Equations
- 1.2 Gaussian Elimination
- 1.3 Matrices and Matrix Operations
- 1.4 Inverses; Algebraic Properties of Matrices
- 1.5 Elementary Matrices and a Method for finding A-inverse
- 1.6 More on Linear Systems and Invertible Matrices
- 1.7 Diagonal, Triangular, and Symmetric Matrices

**Review**

**Homework 1 is due**

**Test 1**

#### **Chapter 2**

##### DETERMINANTS

- 2.1 Determinants by Cofactor Expansion
- 2.2 Evaluating Determinants by Row Reduction
- 2.3 Properties of the Determinant s; Cramer's Rule

**Review**

**Homework 2 is due**

**Test 2**

#### **Chapter 3**

##### EUCLIDEAN VECTOR SPACES

- 3.1 Vectors in 2- Space, 3 – Space, and n- Space
- 3.2 Norm, Dot Product, and Distance in  $R^n$
- 3.3 Orthogonality
- 3.5 Cross Product

**Review**

**Homework 3 is due**

**Test 3**

#### **Chapter 4**

## GENERAL VECTOR SPACES

- 4.1 Real Vector spaces
- 4.2 Subspaces
- 4.3 Linear Independence
- 4.4 Coordinate and Basis
- 4.5 Dimension
- 4.6 Change of Base
- 4.7 Row Space, Column Space, and Null Space

**Review**

**Homework 4 is due**

**Test 4**

## Chapter 5

### EIGENVALUES AND EIGENVECTORS

- 5.1 Eigenvalues and Eigenvectors
- 5.2 Diagonalization
- 5.3 Complex Vector Spaces
- 5.4 Applications: Differential Equations
- 5.5 Row Space, Column Space, and Null Space

**Review**

**Homework 5 is due**

**Test 5**

**Review Final**

**Final Exam.**

## IX. Teaching Strategies

The majority of the material of the course will be given in lecture format. There is a short review before and after each lecture. There will be a comprehensive review after the completion of each chapter. Power point, Graphing Calculator and Maple/Matlab will be used in the class to help students develop a firm grasp of the underlying mathematical concepts.

## X. Bibliography

1. Cullen, Charles G., Linear Algebra with Application, 2nd Ed., Addison Wesley, 1997.
2. Szabo, Fred, Linear Algebra, Academic Press, 2000