National University

Of Computer & Emerging Sciences
Karachi

Course Outlines of BS (CS) Degree Program

Course Instructor(s)	Dr. Sadaqat Hussain / Ms. Fareeha /Mr. Amjad / Ms. Amber	**Semester**	Fall
Batch/Section(s)	Session 2018 / D, F, H / A, C, E / G / B	**Year**	2019
Course Title	Linear Algebra	**Credit Hours**	3
Prerequisite(s)	College Mathematics	**Course TA**	

Text Book(s)

1.Title of book	Elementry Linear Algebra 11th edition		
Author(s)	Howard Anton, Chris Rorres	Publisher	
2.Title of book	Linear Algebra and its Applications 4th edition		
Author(s)	David C. Lay	Publisher	

Reference Book(s)

Linear Algebra and its Applications		
Gilbert Strang	Publisher	
Linear Algebra		
G.E. Shilov	Publisher	

Course Description:

Elementary operations on matrices. Gaussian and Gauss Jordan elimination, Elementary matrices and matrix factorization. Determinants and their properties. Vector spaces, sub spaces and spanning sets. Linear independence, Dimension. Rank of a matrix, Linear transformations. Eigen values and Eigen vectors. Inner product and orthogonal basis. Diagonalization, Quadratic forms and orthogonal Diagonalization, applications.

Course Objective:

The main objective of linear algebra is the study of general vector spaces with special emphasis on n dimensional Euclidean spaces. This course establishes the intricate thread of relationship between system of equations, matrices, determinants, vectors, linear transformations and Eigen values. In this course student will be able to solve electrical circuits using linear algebra techniques.

Week	Contents/Topics	Ex/Chap (Anton)
Week 1	Introduction, System of Linear Equations, Elementary row operations, Echelon, reduced echelon form	1.1 1.2
Week 2	Solutions of linear systems, Consistency, Gauss elimination & Gauss Jordan methods, operations on matrices	1.2, 1.3
Week 3	Inverse of a matrix and Special Matrices.	1.4, 1.5, 1.6, 1.7
Week 4	Matrix Transformation, Applications of linear systems	1.8, 1.9
Week 5	Evaluation of Determinants and their properties	2.1, 2.2, 2.3
Week 6	**MidTerm-1**	
Week 7	Vector Spaces, Subspaces, Linear Independence,	4.1,4.2,4.3
Week 8	Bases, coordinate system, dimensions	4.4,4.5
Week 9	Row, Column and Null spaces, Rank ad Nullity	4.7,4.8
Week 10	Matrix transformation	4.9
Week 11	Eigenvalues & Eigenvectors	5.1
Week 12	**Midterm-II**	
Week 13	Diagonalization and Inner product space, norm, distance, angle,	5.2, 6.1
Week 14	Orthogonality and Gram-Schmidt Process**,** QR decomposition	6.2, 6.3
Week 15	Orthogonal matrices, Orthogonal Diagonalization and Quadratic Forms	7.1, 7.2, 7.3
Week 16	Revision	

Tentative Grading Criteria:

Marks Distribution:

Particulars	% Marks
1. Class participation	05
2. Quizzes	10
3. Presentations/Assignments	05
3. First Sessional Exam	15
3. Second Sessional Exam	15
4. Final Project	00
05. Final Exam	50
Total:-	**100**

Important Instructions to be followed for this Course

- **Be in classroom on time**. Any student who arrives more than 5 min late in the class would be marked LATE. Anybody coming to class more than 15 minutes late will be marked ABSENT.
- **Turn off your cell phones** or any other electronic devices before entering the class.
- Maintain the decorum of the class room all the time.
- **Avoid a conversation** with your classmates while lecture is in progress.
- There would be **no re-take** of any quiz.

Instructions / Suggestions for satisfactory progress in this course:

- On average, most students find at least three hours outside of class for each class hour necessary for satisfactory learning.
- Chapters should be read and homework should be attempted before class.
- Do not get behind. You are encouraged to work with other students. Plus, I am always available during office hours to help you.
- The homework assigned is a minimum. You may always work extra hours on your own.
- Use the few minutes you usually have before the start of each class to review the prior meetings' notes and homework. This will save us valuable in-class time to work on new material.
- Develop a learning habit rather than memorizing.
- Work in groups, whenever appropriate.
- Apply the learned principles and gained knowledge.
- Be creative in thinking, but stick to the topic assigned for discussions, assignments and presentations.
- Always bring your text Books with you in the class.

Note: Students are welcome all the time to get help from the Teacher.