



Course Outlines of BS (CS) Degree Program

Course Instructor	Fareeha Sultan, Nadeem Khan	Semester	Spring
Batch/Section(s)	Batch 2019/ 4A, 4B	Year	2021
Course Title	MT104-Linear Algebra	Credit Hours	3
Prerequisite(s)	None	Course TA	

Text Book(s)

Title of book	Elementary Linear Algebra, 11 th edition
Author(s)	Howard Anton and Chris Rorres

Reference Book(s)

Title of book	Elementary Linear Algebra
Author(s)	Bernard Kolman
Title of book	Coding the Matrix: Linear Algebra through Applications to Computer Science
Author(s)	Philip N Klein

Course Objective:

The course is designed to:

- Enhance the study of general Vector Spaces with special emphasis on n dimensional Euclidean spaces.
- Establish the intricate thread of relationship between system of equations, matrices, determinants, vectors, linear transformation and Eigenvalues.
- Make students comprehend that one of the most important applications of linear algebra to Computer Science.
- Make students able to solve graphic problems using linear algebra techniques.

Course Description:

Elementary operations on matrices, Gaussian and Gauss Jordan elimination, Elementary matrices and matrix factorization, determinants and their properties, vector spaces, subspaces and spanning sets, linear independence, dimensions, rank of a matrix, linear transformation, Eigenvalues and Eigenvectors, inner product and orthogonal basis, diagonalization and orthogonal diagonalization, application of linear algebra.

Tentative Weekly Lectures Schedule:

Week	Contents/Topics	Remarks	Exercises	CLO's
Week 1	Introduction, System of Linear equations, Elementary row operation		1.1 (1-20) 1.2 (1-26)	1
Week 2	Solving system of Linear equations, Gaussian Elimination and Gauss Jordan methods, Rank of a matrix		1.3 (1-20) 1.5 (1-6, 11-18)	
Week 3	Minors, Cofactors, Inverse using cofactors, Inverse by elementary row operations	Assignment 1	1.6 (1-20) 1.7 (1-10, 19-28) 1.8 (1-20)	
Week 4	Homogeneous System of Linear Equations, Determinants and their properties		2.1 (1-32) 2.2 (1-23)	
Week 5	General vector spaces,		2.3 (1-29, 31, 32) 4.1 (1-14)	
Week 6	Review of 1st Mid Term Exam			
Week 7	Subspaces, Linear Combination, Linear Independence,		4.2 (1, 2, 7-15, 19, 20) 4.3 (1-14, 16-21)	2
Week 8	bases and Dimensions, Row and Column Space,	Assignment 2	4.4 (1-19, 21, 22, 25, 26) 4.5 (1-5)	
Week 9	Rank and Nullity, Bases for row and column spaces		4.7 (1-13) 4.8 (1-13)	
Week 10	Eigenvalues and Eigenvectors, Diagonalization		5.1 (1-16) 5.2 (1-20)	
Week 11	Review of 2nd Mid Term Exam			
Week 12	Inner product spaces, Orthogonal and orthonormal bases, Gram-Schmidt Process;	Assignment 3	6.1 (1-26) 6.2 (1-12, 17-19)	3
Week 13	QR-Decomposition. Diagonalization		6.3 (1-14, 27-31, 44-49) 7.1 (1-6)	
Week 14	Orthogonal Diagonalization, Quadratic Forms	Assignment 4	7.2 (1-18) 7.3 (1-8)	
Week 15	Applications of linear Algebra (Implementation of linear algebraic techniques)		1.9 (1-8)	3
Week 16	Revision for final exam			

Grading Criteria:**Marks Distribution:**

Particulars	% Marks
1. Assignments and Presentations	20
2. First Mid Exam	15
3. Second Mid Exam	15
4. Final Exam	50
Total:	100

- Be in classroom on time. Any student who arrives more than 5 minutes 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.
- Submit your assignments on time, no assignment will be accepted after the deadline.

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 Work Book with you in the class.

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