



University of Management and Technology

School of Science

Department of Mathematics

Course Code: MA-210

Course Title: Linear Algebra

Course Outline (Spring 2021)

Schedule	As per time table	Pre-requisite	MA-100
Course Coordinator	Dr. Ghulam Murtaza	Contact	ghulammurtaza@umt.edu.pk
Course Description	<p>Linear Algebra is an important course for mathematics, physics, economics and computer-science majors. Students apply the concepts and methods described in the syllabus and will become capable to solve problems using linear algebra, they will know a number of applications of linear algebra, and they will be able to understand the logic (proof) behind a particular phenomenon. The text and class discussion will introduce the concepts, methods, applications, and proofs; students will practice them and solve problems on assignments, and they will be tested on quizzes, midterms, and the final. For physics majors this subject has applications in quantum mechanics, economics majors will find it useful in courses like econometrics, computer-science students will see its application in computer graphics.</p>		
Expected Outcomes	<p>Understand, read and write the elementary results of Linear Algebra and acquire basic Mathematical knowledge.</p> <p>Apply course knowledge creatively and critically to develop problem-solving skills based on logical and abstract explanation.</p> <p>Students will be able to see the connections between the abstract topics like vector spaces/subspaces and applied topics like rotation matrices/inner product spaces which will further help them to see the similarities between Linear Algebra and other courses e.g. Computer Graphics and Quantum Mechanics and feel confident to study those courses in the future.</p> <p>Value the group learning environment by demonstrating ability for working in a group and help each other to develop interest in retaining and using the results throughout the course.</p>		
Text Book	Elementary Linear Algebra, Applications Version, 10 th edition by Howard Anton and Chris Rorres		
Reference Book:	<p>1) Linear Algebra, 4th edition, by Friedberg, Insel, and Spence, published by Pearson, 2003. ISBN-10: 0130084514, ISBN-13: 9780130084514</p> <p>2) Larson, Ron and David C. Falvo. <i>Elementary Linear Algebra</i>. 6th edition. 2009. Type: Textbook, ISBN: 9780618783762</p>		
Assignments	As per UMT policy	Quizzes	As per UMT policy
Mid Term	As per UMT policy	Final	As per UMT policy

Examination		Examination	
Attendance Policy	As per UMT policy		
Grading Policy	As per UMT policy		

Course Plan of MA-210 Linear Algebra (Spring 2021)

Book: Linear Algebra by Howard Anton, 10 th Edition		
Chapter	Topics	Exercises to be covered with Practice questions
1	Introduction to Systems of Linear Equations Gaussian Elimination Method for Finding inverse A^{-1} More on Linear Systems and Invertible Matrices Applications of Linear Systems	Ex 1.1 (1-14) Ex 1.2 (1-30) Ex 1.5 (9-24) Ex 1.6 (13-17) Ex 1.8 (1-8)
2	Evaluating determinants by i) Cofactor expansion ii) row reduction	Ex 2.1 (1-26) Ex 2.2 (10-17)
3	Vector in plane Norm and Dot product of Vectors Orthogonality	Ex 3.1 (7-15) Ex 3.2 (1-23) Ex 3.3 (1-40)
4	Real Vector Spaces Subspaces Linear Independence Coordinates and Basis Dimension Rank, Nullity, and the Fundamental Matrix Spaces Dynamical Systems and Markov Chains	Ex 4.1 (1-9, 11, 12) Ex 4.2 (1-13, 15) Ex 4.3 (1-9) Ex 4.4 (1-15) Ex 4.5 (1-6) Ex 4.8 (2) 4.12 (1-4)
5	Eigenvalues and Eigenvectors Diagonalization	Ex 5.1 (1-14) Ex 5.2 (7-25)
6	Inner Products Gram–Schmidt Process; QR- Decomposition	Ex 6.1 (1-20) Ex 6.3 (21-29)
8	General Linear Transformations Isomorphism	Ex 8.1 (1-22) Ex 8.2 (1-11)