

NEAR EAST UNIVERSITY - COMMON COURSES COORDINATION UNIT



Department of Mathematics
Course Information Sheet & Course Outline

Course Code MTH113	Course Name Linear Algebra I	Credit 3	ECTS 5			
Pre-requisite:-						
Language: English		Course Type: Compulsory		Year: 2019-2020		
Weekly Hours	Class Hours	Laboratory	Practicum	Learning Sessions		
	3	-	-	PS	C	R
Learning Outcomes			After the completion of this course, the student will be able to ► use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization ► use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, especially in R^2 and R^3 , as well as conceptually extend these results to higher dimensions ► analyze and construct mathematical arguments that relate to the study of introductory linear algebra ► use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions			
Course Description	System of linear equations: elementary row operations, echelon forms, Gaussian elimination method. Matrices: elementary matrices, invertible matrices, Determinants: adjoint and inverse matrices, Cramer's rule. Vector spaces: linear independence, basis, dimension. Linear mapping. Inner product spaces, Orthonormal Bases: Gram-Schmidt Process. Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Diagonalization.					
Course Objectives	The course is standard first-year course on linear algebra providing basic definitions, concepts and methods. The main objectives are two: to make students ready to see applications of linear algebra on subsequent courses and to enable them to continue their study on more advanced level.					
Textbooks and/or References	1	ELEMENTARY LINEAR ALGEBRA, 10 TH EDITION, HOWARD ANTON, CHRIS RORRES, 2010				
	2	LINEAR ALGEBRA with APPLICATIONS, 5 TH EDITION, W. KEITH NICHOLSON				
	3	ELEMENTARY LINEAR ALGEBRA, UNIVERSITY OF QUEENSLAND, K. R. MATTHEWS, 2013				
	4					
	5					
Course Content	1. Introduction to Systems of Linear Equations. Gaussian Elimination 2. Matrices and Matrix Operations 3. Inverses; Rules of Matrix Arithmetic. Elementary Matrices and a Method for finding A^{-1} 4. Further Results on Systems of Linear Equations and Invertibility 5. Diagonal, Triangular, and Symmetric Matrices 6. Determinants by Cofactor Expansion. Evaluating Determinants by Row Reduction 7. Properties of the Determinant Function 8. Euclidean n -Space. Linear Transformations from R^n to R^m . 9. Properties of Linear Transformations from R^n to R^m . Linear Transformations and polynomials 10. Real Vector Spaces, Subspaces. Linear Independence. Basis and Dimension. 11. Row Space, Column Space, and Nullspace. Rank and Nullity. 12. Inner Products. Angle and Orthogonality in Inner Product Spaces. Orthonormal Bases: Gram-Schmidt Process 13. Eigenvalues and Eigenvectors. Diagonalization					