

Course Code	MTH100			
Course Name	Math 1			
Credits	4			
Course Offered to	UG			
Course Description	This first level math course covers basics of linear algebra including vector spaces, matrix algebra, linear transformations, eigenvalues and eigenvectors, orthogonality, properties of symmetric matrices, positive definite matrices, and SVD. The course is developed with an aim to provide a strong foundation in linear algebra which will be used in the subsequent curriculum by both CS and ECE students. Time permitting, some applications of linear algebra in engineering disciplines will be introduced. The course also attempts to increase the mathematical maturity of students by introducing proofs and mathematical rigour.			
Pre-requisites				
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)		
None	None	None		
*Please insert more rows if required				
Post Conditions*(For suggestions on verbs please refer the second sheet)				
CO1	CO2	CO3	CO4	CO5
Students are able to compute solutions, forms and metrics related to linear algebra using the applicable results/methods (students provided with a full list)	Students are able to test/classify for the given conditions using the given criteria or test (students provided with a full list)	Students are able to determine the truth/falsity of statements involving vector spaces & linear transformations and justify or explain the answer using any of the techniques/results covered up to date	Students are able to construct proofs for statements involving vector spaces and linear transformations using any of the results covered up to date	Students are able to design alternative methods/algorithms/tests using the results covered up to date
Weekly Lecture Plan				
Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial	
Weeks 1/2/3	Systems of linear equations, row reduction and echelon forms, matrix equation of the form $Ax = b$, invertibility of matrices	CO1,CO2,CO3,CO4	Homework, tutorial, quiz consisting of related short problems	
Weeks-4/5/6	Vector spaces and subspaces, linear dependence/independence, dimension, span, applications. Fundamental subspaces.	CO1,CO2,CO3,CO4,CO5	Homework, tutorial, quiz consisting of related short problems	

Weeks-7/8/9	Linear transformation, rank. Matrix of linear transformation, effect of change of basis, similarity transformation. Algebra of linear transformations. Determinants, properties of determinants, Cramers rule, volume.	CO1,CO2,CO3,CO4	Homework, tutorial, quiz consisting of related short problems
Weeks-10/11	Eigenvalues and eigenvectors, diagonalization of a matrix, eigenvectors and linear transformations, complex eigenvalues.	CO1,CO2,CO3,CO4	Homework, tutorial, quiz consisting of related short problems
Weeks-12/13	Orthogonality and least squares, inner product, length, orthogonal projections, Gram-Schmidt orthogonalization, QR decomposition. Symmetric matrices and Quadratic forms, diagonalization of symmetric matrices, positive definite matrices, SVD, application to image processing.	CO1,CO2,CO3,CO4	Homework, tutorial, quiz consisting of related short problems

*Please insert more rows if required

Weekly Lab Plan			
Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)

*Please insert more rows if required

Assessment Plan	
Type of Evaluation	% Contribution in Grade
Test	10
Mid-Semester Exam	20
Weekly submission, quiz	25
End-Semester Exam	45

*Please insert more row for other type of Evaluation

Resource Material	
Type	Title

Textbook	David Lay: Linear Algebra and Its Applications, 3rd (Indian Edition), Pearson.
Reference Book	Strang: Linear Algebra and Its Applications, 4th Edn, Cengage.
Reference Book	. Hoffman & Kunze: Linear Algebra, Pearson.