

## DSC 03: Mathematics for computing

### Syllabus with Planner

Unit	Topic	Month wise schedule to be followed	Test/ Assignment/Revision
1	Introduction to Matrix Algebra: Echelon form of a Matrix, Rank of a Matrix, Determinant and Inverse of a matrix, Solution of System of Homogeneous & Non-Homogeneous Equations: Gauss elimination and Solution of System of Homogeneous Equations: Gauss Jordan Method.	<b>September</b>	<b>Test in last week of September</b>
	<b>Discussion of doubts of the test</b>		
2	Vector Space and Linear Transformation: Vector Space, Sub-spaces, Linear Combinations, Linear Span, Convex Sets, Linear Independence/Dependence, Basis & Dimension, Linear transformation on finite dimensional vector spaces, Inner Product Space, Schwarz Inequality, Orthonormal Basis, Gram-Schmidt Orthogonalization Process.	<b>October</b>	<b>Test of Vector Spaces in 3<sup>rd</sup> week of October.</b>
	<b>Assignment of unit 1 and unit 2 during mid -sem break</b>		
3	Eigenvalue and Eigenvector: Characteristic Polynomial, Cayley Hamilton Theorem, Eigen Value and Eigen Vector of a matrix, Eigenspaces, Diagonalization, Positive Definite Matrices, Applications to Markov Matrices	<b>1<sup>st</sup> 3 weeks of November</b>	<b>Assignment +test in 3<sup>rd</sup> week</b>
	<b>Revision and doubt session</b>		
4	Vector Calculus: Vector Algebra, Laws of Vector Algebra, Dot Product, Cross Product, Vector and Scalar Fields, Ordinary Derivative of Vectors, Space Curves, Partial Derivatives, Del Operator, Gradient of a Scalar Field, Directional Derivative, Gradient of Matrices, Divergence of a Vector Field, Laplacian Operator, Curl of a Vector Field.	<b>Last week of November till mid of December.</b>	<b>Assignment</b>
<b>Revision of whole syllabus</b>			

**References:**

1. Kreyszig Erwin, “Advanced Engineering Mathematics”, 10<sup>th</sup> Edition, Wiley, 2015.
2. David C. Lay, Steven R. Lay and Judi J. McDonald, “Linear Algebra and its applications”, 5<sup>th</sup> edition, Pearson.

**Additional References:**

1. Strang Gilbert, “Introduction to Linear Algebra”, 5<sup>th</sup> Edition, Wellesley-Cambridge Press, 2021.
  2. Stephen Andrilli and David Hecker, “Elementary Linear Algebra”, Fourth Edition, Academic Press, 2010, ISBN: 978-0-12-374751-8
- \* Deisenroth, Marc Peter, Faisal A. Aldo and Ong Chengsoonm “Mathematics for Machine Learning, 1<sup>st</sup> Edition, Cambridge University Press, 2020