

## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mathematics - NOC:Linear Algebra (Prof. A.K. Lal)

Subject Co-ordinator - Prof. A.K. Lal

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

- Lecture 1 - Notations, Motivation and Definition
- Lecture 2 - Matrix: Examples, Transpose and Addition
- Lecture 3 - Matrix Multiplication
- Lecture 4 - Matrix Product Recalled
- Lecture 5 - Matrix Product (Continued...)
- Lecture 6 - Inverse of a Matrix
- Lecture 7 - Introduction to System of Linear Equations
- Lecture 8 - Some Initial Results on Linear Systems
- Lecture 9 - Row Echelon Form (REF)
- Lecture 10 - LU Decomposition - Simplest Form
- Lecture 11 - Elementary Matrices
- Lecture 12 - Row Reduced Echelon Form (RREF)
- Lecture 13 - Row Reduced Echelon Form (RREF) (Continued...)
- Lecture 14 - RREF and Inverse
- Lecture 15 - Rank of a matrix
- Lecture 16 - Solution Set of a System of Linear Equations
- Lecture 17 - System of n Linear Equations in n Unknowns
- Lecture 18 - Determinant
- Lecture 19 - Permutations and the Inverse of a Matrix
- Lecture 20 - Inverse and the Cramer's Rule
- Lecture 21 - Vector Spaces
- Lecture 22 - Vector Subspaces and Linear Span
- Lecture 23 - Linear Combination, Linear Independence and Dependence
- Lecture 24 - Basic Results on Linear Independence
- Lecture 25 - Results on Linear Independence (Continued...)
- Lecture 26 - Basis of a Finite Dimensional Vector Space
- Lecture 27 - Fundamental Spaces associated with a Matrix
- Lecture 28 - Rank - Nullity Theorem
- Lecture 29 - Fundamental Theorem of Linear Algebra

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- Lecture 30 - Definition and Examples of Linear Transformations
- Lecture 31 - Results on Linear Transformations
- Lecture 32 - Rank-Nullity Theorem and Applications
- Lecture 33 - Isomorphism of Vector Spaces
- Lecture 34 - Ordered Basis of a Finite Dimensional Vector Space
- Lecture 35 - Ordered Basis (Continued...)
- Lecture 36 - Matrix of a Linear Transformation
- Lecture 37 - Matrix of a Linear Transformation (Continued...)
- Lecture 38 - Matrix of a Linear Transformation (Continued...)
- Lecture 39 - Similarity of Matrices
- Lecture 40 - Inner Product Space
- Lecture 41 - Inner Product (Continued...)
- Lecture 42 - Cauchy Schwartz Inequality
- Lecture 43 - Projection on a Vector
- Lecture 44 - Results on Orthogonality
- Lecture 45 - Results on Orthogonality (Continued...)
- Lecture 46 - Gram-Schmidt Orthonormalization Process
- Lecture 47 - Orthogonal Projections
- Lecture 48 - Gram-Schmidt Process: Applications
- Lecture 49 - Examples and Applications on QR-decomposition
- Lecture 50 - Recapitulate ideas on Inner Product Spaces
- Lecture 51 - Motivation on Eigenvalues and Eigenvectors
- Lecture 52 - Examples and Introduction to Eigenvalues and Eigenvectors
- Lecture 53 - Results on Eigenvalues and Eigenvectors
- Lecture 54 - Results on Eigenvalues and Eigenvectors (Continued...)
- Lecture 55 - Results on Eigenvalues and Eigenvectors (Continued...)
- Lecture 56 - Diagonalizability
- Lecture 57 - Diagonalizability (Continued...)
- Lecture 58 - Schur's Unitary Triangularization (SUT)
- Lecture 59 - Applications of Schur's Unitary Triangularization
- Lecture 60 - Spectral Theorem for Hermitian Matrices
- Lecture 61 - Cayley Hamilton Theorem
- Lecture 62 - Quadratic Forms
- Lecture 63 - Sylvester's Law of Inertia
- Lecture 64 - Applications of Quadratic Forms to Analytic Geometry
- Lecture 65 - Examples of Conics and Quartics
- Lecture 66 - Singular Value Decomposition (SVD)