

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

NPTEL Video Course - Mathematics - NOC:Mathematical Methods in Physics 1

Subject Co-ordinator - Prof. Auditya Sharma

Co-ordinating Institute - IISER - Bhopal

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

Lecture 1 - Vectors  
Lecture 2 - Linear vector spaces  
Lecture 3 - Linear vector spaces: immediate consequences  
Lecture 4 - Dot product of Euclidean vectors  
Lecture 5 - Inner product on a Linear vector space  
Lecture 6 - Cauchy-Schwartz inequality for Euclidean vectors  
Lecture 7 - Cauchy-Schwartz inequality for vectors from LVS  
Lecture 8 - Applications of the Cauchy-Schwartz inequality  
Lecture 9 - Triangle inequality  
Lecture 10 - Linear dependence and independence of vectors  
Lecture 11 - Row reduction of matrices  
Lecture 12 - Rank of a matrix  
Lecture 13 - Rank of a matrix: consequences  
Lecture 14 - Determinants and their properties  
Lecture 15 - The rank of a matrix using determinants  
Lecture 16 - Cramer's rule  
Lecture 17 - Square system of equations  
Lecture 18 - Homogeneous equations  
Lecture 19 - The rank of a matrix and linear dependence  
Lecture 20 - Span, basis, and dimension of a LVS  
Lecture 21 - Gram-Schmidt orthogonalization  
Lecture 22 - Vector subspaces  
Lecture 23 - Linear operators  
Lecture 24 - Inverse of an operator  
Lecture 25 - Adjoint of an operator  
Lecture 26 - Projection operators  
Lecture 27 - Eigenvalues and Eigenvectors  
Lecture 28 - Hermitian operators  
Lecture 29 - Unitary operators

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- Lecture 30 - Normal operators
- Lecture 31 - Similarity and Unitary transformations
- Lecture 32 - Matrix representations
- Lecture 33 - Eigenvalues and Eigenvectors of matrices
- Lecture 34 - Defective matrices
- Lecture 35 - Eigenvalues and eigenvectors: useful results
- Lecture 36 - Transformation of Basis
- Lecture 37 - A class of invertible matrices
- Lecture 38 - Diagonalization of matrices
- Lecture 39 - Diagonalizability of matrices
- Lecture 40 - Functions of matrices
- Lecture 41 - SHM and waves
- Lecture 42 - Periodic functions
- Lecture 43 - Average value of a function
- Lecture 44 - Piecewise continuous functions
- Lecture 45 - Orthogonal basis: Fourier series
- Lecture 46 - Fourier coefficients
- Lecture 47 - Dirichlet Conditions
- Lecture 48 - Complex Form of Fourier Series
- Lecture 49 - Other intervals: arbitrary period
- Lecture 50 - Even and Odd Functions
- Lecture 51 - Differentiating Fourier series
- Lecture 52 - Parseval's theorem
- Lecture 53 - Fourier series to Fourier transforms
- Lecture 54 - Fourier Sine and Cosine transforms
- Lecture 55 - Parseval's theorem for Fourier series
- Lecture 56 - Ordinary Differential equations
- Lecture 57 - First order ODEs
- Lecture 58 - Linear first order ODEs
- Lecture 59 - Orthogonal Trajectories
- Lecture 60 - Exact differential equations
- Lecture 61 - Special first order ODEs
- Lecture 62 - Solutions of linear first-order ODEs
- Lecture 63 - Revisit linear first-order ODEs
- Lecture 64 - ODEs in disguise
- Lecture 65 - 2nd order Homogeneous linear equations with constant coefficients
- Lecture 66 - The use of a known solution to find another
- Lecture 67 - An alternate approach to auxiliary equation
- Lecture 68 - Inhomogeneous second order equations

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- Lecture 69 - Methods to find a Particular solution
- Lecture 70 - Successive Integration of two first order equations
- Lecture 71 - Illustrative examples
- Lecture 72 - Variation of Parameters
- Lecture 73 - Vibrations in mechanical systems
- Lecture 74 - Forced Vibrations
- Lecture 75 - Resonance
- Lecture 76 - Linear Superposition
- Lecture 77 - Laplace Transform (LT)
- Lecture 78 - Basic Properties of Laplace Transforms
- Lecture 79 - Step functions, Translations, and Periodic functions
- Lecture 80 - The Inverse Laplace Transform
- Lecture 81 - Convolution of functions
- Lecture 82 - Solving ODEs using Laplace transforms
- Lecture 83 - The Dirac Delta function
- Lecture 84 - Properties of the Dirac Delta function
- Lecture 85 - Green's function method
- Lecture 86 - Green's function method: Boundary value problem
- Lecture 87 - Power series method
- Lecture 88 - Power series solutions about an ordinary point
- Lecture 89 - Initial value problem: power series solution
- Lecture 90 - Frobenius method for regular singular points