

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

NPTEL Video Course - Mathematics - Elementary Numerical Analysis

Subject Co-ordinator - Prof. Rekha P. Kulkarni

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction
Lecture 2 - Polynomial Approximation
Lecture 3 - Interpolating Polynomials
Lecture 4 - Properties of Divided Difference
Lecture 5 - Error in the Interpolating polynomial
Lecture 6 - Cubic Hermite Interpolation
Lecture 7 - Piecewise Polynomial Approximation
Lecture 8 - Cubic Spline Interpolation
Lecture 9 - Tutorial 1
Lecture 10 - Numerical Integration
Lecture 11 - Composite Numerical Integration
Lecture 12 - Gauss 2-point Rule
Lecture 13 - Gauss 2-point Rule
Lecture 14 - Convergence of Gaussian Integration
Lecture 15 - Tutorial 2
Lecture 16 - Numerical Differentiation
Lecture 17 - Gauss Elimination
Lecture 18 - L U decomposition
Lecture 19 - Cholesky decomposition
Lecture 20 - Gauss Elimination with partial pivoting
Lecture 21 - Vector and Matrix Norms
Lecture 22 - Perturbed Linear Systems
Lecture 23 - Ill-conditioned Linear System
Lecture 24 - Tutorial 3
Lecture 25 - Effect of Small Pivots
Lecture 26 - Solution of Non-linear Equations
Lecture 27 - Quadratic Convergence of Newton's Method
Lecture 28 - Jacobi Method
Lecture 29 - Gauss-Seidel Method

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- Lecture 30 - Tutorial 4
- Lecture 31 - Initial Value Problem
- Lecture 32 - Multi-step Methods
- Lecture 33 - Predictor-Corrector Formulae
- Lecture 34 - Boundary Value Problems
- Lecture 35 - Eigenvalues and Eigenvectors
- Lecture 36 - Spectral Theorem
- Lecture 37 - Power Method
- Lecture 38 - Inverse Power Method
- Lecture 39 - Q R Decomposition
- Lecture 40 - Q R Method

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NPTEL Video Course - Mathematics - Measure and Integration

Subject Co-ordinator - Prof. Inder K Rana

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Introduction, Extended Real numbers
- Lecture 2 - Algebra and Sigma Algebra of a subset of a set
- Lecture 3 - Sigma Algebra generated by a class
- Lecture 4 - Monotone Class
- Lecture 5 - Set function
- Lecture 6 - The Length function and its properties
- Lecture 7 - Countably additive set functions on intervals
- Lecture 8 - Uniqueness Problem for Measure
- Lecture 9 - Extension of measure
- Lecture 10 - Outer measure and its properties
- Lecture 11 - Measurable sets
- Lecture 12 - Lebesgue measure and its properties
- Lecture 13 - Characterization of Lebesgue measurable sets
- Lecture 14 - Measurable functions
- Lecture 15 - Properties of measurable functions
- Lecture 16 - Measurable functions on measure spaces
- Lecture 17 - Integral of non negative simple measurable functions
- Lecture 18 - Properties of non negative simple measurable functions
- Lecture 19 - Monotone convergence theorem & Fatou's Lemma
- Lecture 20 - Properties of Integral functions & Dominated Convergence Theorem
- Lecture 21 - Dominated Convergence Theorem and applications
- Lecture 22 - Lebesgue Integral and its properties
- Lecture 23 - Denseness of continuous function
- Lecture 24 - Product measures, an Introduction
- Lecture 25 - Construction of Product Measure
- Lecture 26 - Computation of Product Measure - I
- Lecture 27 - Computation of Product Measure - II
- Lecture 28 - Integration on Product spaces
- Lecture 29 - Fubini's Theorems

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- Lecture 30 - Lebesgue Measure and integral on \mathbb{R}^2
- Lecture 31 - Properties of Lebesgue Measure and integral on \mathbb{R}^n
- Lecture 32 - Lebesgue integral on \mathbb{R}^2
- Lecture 33 - Integrating complex-valued functions
- Lecture 34 - L_p - spaces
- Lecture 35 - $L^2(X, S, \mu)$
- Lecture 36 - Fundamental Theorem of calculus for Lebesgue Integral - I
- Lecture 37 - Fundamental Theorem of calculus for Lebesgue Integral - II
- Lecture 38 - Absolutely continuous measures
- Lecture 39 - Modes of convergence
- Lecture 40 - Convergence in Measure

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

NPTEL Video Course - Mathematics - Mathematics in India - From Vedic Period to Modern Times

Subject Co-ordinator - Prof. M.D. Srinivas, Prof. K. Ramasubramanian, Prof. M.S. Sriram

Co-ordinating Institute - Centre for Policy Studies, Chennai | IIT - Bombay | University of Madras, Chennai

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

- Lecture 1 - Indian Mathematics
- Lecture 2 - Vedas and Sulbasutras - Part 1
- Lecture 3 - Vedas and Sulbasutras - Part 2
- Lecture 4 - Panini's Astadhyayi
- Lecture 5 - Pingala's Chandahsastra
- Lecture 6 - Decimal place value system
- Lecture 7 - Aryabhata's Aryabhata - Part 1
- Lecture 8 - Aryabhata's Aryabhata - Part 2
- Lecture 9 - Aryabhata's Aryabhata - Part 3
- Lecture 10 - Aryabhata's Aryabhata - Part 4 and Introduction to Jaina Mathematics
- Lecture 11 - Brahmasphutasiddhanta of Brahmagupta - Part 1
- Lecture 12 - Brahmasphutasiddhanta of Brahmagupta - Part 2
- Lecture 13 - Brahmasphutasiddhanta of Brahmagupta - Part 3
- Lecture 14 - Brahmasphutasiddhanta of Brahmagupta - Part 4 and The Bakhshali Manuscript
- Lecture 15 - Mahavira's Ganitasarasangraha - Part 1
- Lecture 16 - Mahavira's Ganitasarasangraha - Part 2
- Lecture 17 - Mahavira's Ganitasarasangraha - Part 3
- Lecture 18 - Development of Combinatorics - Part 1
- Lecture 19 - Development of Combinatorics - Part 2
- Lecture 20 - Lilavati of Bhaskaracarya - Part 1
- Lecture 21 - Lilavati of Bhaskaracarya - Part 2
- Lecture 22 - Lilavati of Bhaskaracarya - Part 3
- Lecture 23 - Bijaganita of Bhaskaracarya - Part 1
- Lecture 24 - Bijaganita of Bhaskaracarya - Part 2
- Lecture 25 - Ganitakaumudi of Narayana Pandita - Part 1
- Lecture 26 - Ganitakaumudi of Narayana Pandita - Part 2
- Lecture 27 - Ganitakaumudi of Narayana Pandita - Part 3
- Lecture 28 - Magic Squares - Part 1
- Lecture 29 - Magic Squares - Part 2

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- Lecture 30 - Development of Calculus in India - Part 1
- Lecture 31 - Development of Calculus in India - Part 2
- Lecture 32 - Jyanayanam
- Lecture 33 - Trigonometry and Spherical Trigonometry - Part 1
- Lecture 34 - Trigonometry and Spherical Trigonometry - Part 2
- Lecture 35 - Trigonometry and Spherical Trigonometry - Part 3
- Lecture 36 - Proofs in Indian Mathematics - Part 1
- Lecture 37 - Proofs in Indian Mathematics - Part 2
- Lecture 38 - Proofs in Indian Mathematics - Part 3
- Lecture 39 - Mathematics in Modern India - Part 1
- Lecture 40 - Mathematics in Modern India - Part 2

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

NPTEL Video Course - Mathematics - NOC:Measure Theory

Subject Co-ordinator - Prof. Inder K Rana

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - (1A) Introduction, Extended Real Numbers
- Lecture 2 - (1B) Introduction, Extended Real Numbers
- Lecture 3 - (2A) Algebra and Sigma Algebra of Subsets of a Set
- Lecture 4 - (2B) Algebra and Sigma Algebra of Subsets of a Set
- Lecture 5 - (3A) Sigma Algebra generated by a Class
- Lecture 6 - (3B) Sigma Algebra generated by a Class
- Lecture 7 - (4A) Monotone Class
- Lecture 8 - (4B) Monotone Class
- Lecture 9 - (5A) Set Functions
- Lecture 10 - (5B) Set Functions
- Lecture 11 - (6A) The Length Function and its Properties
- Lecture 12 - (6B) The Length Function and its Properties
- Lecture 13 - (7A) Countably Additive Set Functions on Intervals
- Lecture 14 - (7B) Countably Additive Set Functions on Intervals
- Lecture 15 - (8A) Uniqueness Problem for Measure
- Lecture 16 - (8B) Uniqueness Problem for Measure
- Lecture 17 - (9A) Extension of Measure
- Lecture 18 - (9B) Extension of Measure
- Lecture 19 - (10A) Outer Measure and its Properties
- Lecture 20 - (10B) Outer Measure and its Properties
- Lecture 21 - (11A) Measurable Sets
- Lecture 22 - (11B) Measurable Sets
- Lecture 23 - (12A) Lebesgue Measure and its Properties
- Lecture 24 - (12B) Lebesgue Measure and its Properties
- Lecture 25 - (13A) Characterization of Lebesgue Measurable Sets
- Lecture 26 - (13B) Characterization of Lebesgue Measurable Sets
- Lecture 27 - (14A) Measurable Functions
- Lecture 28 - (14B) Measurable Functions
- Lecture 29 - (15A) Properties of Measurable Functions

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- Lecture 30 - (15B) Properties of Measurable Functions
- Lecture 31 - (16A) Measurable Functions on Measure Spaces
- Lecture 32 - (16B) Measurable Functions on Measure Spaces
- Lecture 33 - (17A) Integral of Nonnegative Simple Measurable Functions
- Lecture 34 - (17B) Integral of Nonnegative Simple Measurable Functions
- Lecture 35 - (18A) Properties of Nonnegative Simple Measurable Functions
- Lecture 36 - (18B) Properties of Nonnegative Simple Measurable Functions
- Lecture 37 - (19A) Monotone Convergence Theorem and Fatou's Lemma
- Lecture 38 - (19B) Monotone Convergence Theorem and Fatou's Lemma
- Lecture 39 - (20A) Properties of Integrable Functions and Dominated Convergence Theorem
- Lecture 40 - (20B) Properties of Integrable Functions and Dominated Convergence Theorem
- Lecture 41 - (21A) Dominated Convergence Theorem and Applications
- Lecture 42 - (21B) Dominated Convergence Theorem and Applications
- Lecture 43 - (22A) Lebesgue Integral and its Properties
- Lecture 44 - (22B) Lebesgue Integral and its Properties
- Lecture 45 - (23A) Product Measure, an Introduction
- Lecture 46 - (23B) Product Measure, an Introduction
- Lecture 47 - (24A) Construction of Product Measures
- Lecture 48 - (24B) Construction of Product Measures
- Lecture 49 - (25A) Computation of Product Measure - I
- Lecture 50 - (25B) Computation of Product Measure - I
- Lecture 51 - (26A) Computation of Product Measure - II
- Lecture 52 - (26B) Computation of Product Measure - II
- Lecture 53 - (27A) Integration on Product Spaces
- Lecture 54 - (27B) Integration on Product Spaces
- Lecture 55 - (28A) Fubini's Theorems
- Lecture 56 - (28B) Fubini's Theorems
- Lecture 57 - (29A) Lebesgue Measure and Integral on \mathbb{R}^2
- Lecture 58 - (29B) Lebesgue Measure and Integral on \mathbb{R}^2
- Lecture 59 - (30A) Properties of Lebesgue Measure on \mathbb{R}^2
- Lecture 60 - (30B) Properties of Lebesgue Measure on \mathbb{R}^2
- Lecture 61 - (31A) Lebesgue Integral on \mathbb{R}^2
- Lecture 62 - (31B) Lebesgue Integral on \mathbb{R}^2

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NPTEL Video Course - Mathematics - NOC:Calculus for Economics, Commerce and Management

Subject Co-ordinator - Prof.Inder Kumar Rana

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Introduction to the Course
- Lecture 2 - Concept of a Set, Ways of Representing Sets
- Lecture 3 - Venn Diagrams, Operations on Sets
- Lecture 4 - Operations on Sets, Cardinal Number, Real Numbers
- Lecture 5 - Real Numbers, Sequences
- Lecture 6 - Sequences, Convergent Sequences, Bounded Sequences
- Lecture 7 - Limit Theorems, Sandwich Theorem, Monotone Sequences, Completeness of Real Numbers
- Lecture 8 - Relations and Functions
- Lecture 9 - Functions, Graph of a Functions, Function Formulas
- Lecture 10 - Function Formulas, Linear Models
- Lecture 11 - Linear Models, Elasticity, Linear Functions, Nonlinear Models, Quadratic Functions
- Lecture 12 - Quadratic Functions, Quadratic Models, Power Function, Exponential Function
- Lecture 13 - Exponential Function, Exponential Models, Logarithmic Function
- Lecture 14 - Limit of a Function at a Point, Continuous Functions
- Lecture 15 - Limit of a Function at a Point
- Lecture 16 - Limit of a Function at a Point, Left and Right Limits
- Lecture 17 - Computing Limits, Continuous Functions
- Lecture 18 - Applications of Continuous Functions
- Lecture 19 - Applications of Continuous Functions, Marginal of a Function
- Lecture 20 - Rate of Change, Differentiation
- Lecture 21 - Rules of Differentiation
- Lecture 22 - Derivatives of Some Functions, Marginal, Elasticity
- Lecture 23 - Elasticity, Increasing and Decreasing Functions, Optimization, Mean Value Theorem
- Lecture 24 - Mean Value Theorem, Marginal Analysis, Local Maxima and Minima
- Lecture 25 - Local Maxima and Minima
- Lecture 26 - Local Maxima and Minima, Continuity Test, First Derivative Test, Successive Differentiation
- Lecture 27 - Successive Differentiation, Second Derivative Test
- Lecture 28 - Average and Marginal Product, Marginal of Revenue and Cost, Absolute Maximum and Minimum
- Lecture 29 - Absolute Maximum and Minimum

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- Lecture 30 - Monopoly Market, Revenue and Elasticity
- Lecture 31 - Property of Marginals, Monopoly Market, Publisher v/s Author Problem
- Lecture 32 - Convex and Concave Functions
- Lecture 33 - Derivative Tests for Convexity, Concavity and Points of Inflection, Higher Order Derivative Conc
- Lecture 34 - Convex and Concave Functions, Asymptotes
- Lecture 35 - Asymptotes, Curve Sketching
- Lecture 36 - Functions of Two Variables, Visualizing Graph, Level Curves, Contour Lines
- Lecture 37 - Partial Derivatives and Application to Marginal Analysis
- Lecture 38 - Marginals in Cobb-Douglas model, partial derivatives and elasticity, chain rules
- Lecture 39 - Chain Rules, Higher Order Partial Derivatives, Local Maxima and Minima, Critical Points
- Lecture 40 - Saddle Points, Derivative Tests, Absolute Maxima and Minima
- Lecture 41 - Some Examples, Constrained Maxima and Minima

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

NPTEL Video Course - Mathematics - NOC:Basic Linear Algebra

Subject Co-ordinator - Prof.Inder Kumar Rana

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Introduction - I
- Lecture 2 - Introduction - II
- Lecture 3 - Introduction - III
- Lecture 4 - Systems of Linear Equations - I
- Lecture 5 - Systems of Linear Equations - II
- Lecture 6 - Systems of Linear Equations - III
- Lecture 7 - Reduced Row Echelon Form and Rank - I
- Lecture 8 - Reduced Row Echelon Form and Rank - II
- Lecture 9 - Reduced Row Echelon Form and Rank - III
- Lecture 10 - Solvability of a Linear System, Linear Span, Basis - I
- Lecture 11 - Solvability of a Linear System, Linear Span, Basis - II
- Lecture 12 - Solvability of a Linear System, Linear Span, Basis - III
- Lecture 13 - Linear Span, Linear Independence and Basis - I
- Lecture 14 - Linear Span, Linear Independence and Basis - II
- Lecture 15 - Linear Span, Linear Independence and Basis - III
- Lecture 16 - Row Space, Column Space, Rank-Nullity Theorem - I
- Lecture 17 - Row Space, Column Space, Rank-Nullity Theorem - II
- Lecture 18 - Row Space, Column Space, Rank-Nullity Theorem - III
- Lecture 19 - Determinants and their Properties - I
- Lecture 20 - Determinants and their Properties - II
- Lecture 21 - Determinants and their Properties - III
- Lecture 22 - Linear Transformations - I
- Lecture 23 - Linear Transformations - II
- Lecture 24 - Linear Transformations - III
- Lecture 25 - Orthonormal Basis, Geometry in \mathbb{R}^2 - I
- Lecture 26 - Orthonormal Basis, Geometry in \mathbb{R}^2 - II
- Lecture 27 - Orthonormal Basis, Geometry in \mathbb{R}^2 - III
- Lecture 28 - Isometries, Eigenvalues and Eigenvectors - I
- Lecture 29 - Isometries, Eigenvalues and Eigenvectors - II

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- Lecture 30 - Isometries, Eigenvalues and Eigenvectors - III
- Lecture 31 - Diagonalization and Real Symmetric Matrices - I
- Lecture 32 - Diagonalization and Real Symmetric Matrices - II
- Lecture 33 - Diagonalization and Real Symmetric Matrices - III
- Lecture 34 - Diagonalization and its Applications - I
- Lecture 35 - Diagonalization and its Applications - II
- Lecture 36 - Diagonalization and its Applications - III
- Lecture 37 - Abstract Vector Spaces - I
- Lecture 38 - Abstract Vector Spaces - II
- Lecture 39 - Abstract Vector Spaces - III
- Lecture 40 - Inner Product Spaces - I
- Lecture 41 - Inner Product Spaces - II

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NPTEL Video Course - Mathematics - NOC:Commutative Algebra

Subject Co-ordinator - Prof. Dilip P. Patil

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Zariski Topology and K-Spectrum

Lecture 2 - Algebraic Varieties and Classical Nullstellensatz

Lecture 3 - Motivation for Krull's Dimension

Lecture 4 - Chevalley's dimension

Lecture 5 - Associated Prime Ideals of a Module

Lecture 6 - Support of a Module

Lecture 7 - Primary Decomposition

Lecture 8 - Primary Decomposition (Continued...)

Lecture 9 - Uniqueness of Primary Decomposition

Lecture 10 - Modules of Finite Length

Lecture 11 - Modules of Finite Length (Continued...)

Lecture 12 - Introduction to Krull's Dimension

Lecture 13 - Noether Normalization Lemma (Classical Version)

Lecture 14 - Consequences of Noether Normalization Lemma

Lecture 15 - Nil Radical and Jacobson Radical of Finite type Algebras over a Field and digression of Integral

Lecture 16 - Nagata's version of NNL

Lecture 17 - Dimensions of Polynomial ring over Noetherian rings

Lecture 18 - Dimension of Polynomial Algebra over arbitrary Rings

Lecture 19 - Dimension Inequalities

Lecture 20 - Hilbert's Nullstellensatz

Lecture 21 - Computational rules for Poincaré Series

Lecture 22 - Graded Rings, Modules and Poincaré Series

Lecture 23 - Hilbert-Samuel Polynomials

Lecture 24 - Hilbert-Samuel Polynomials (Continued...)

Lecture 25 - Numerical Function of polynomial type

Lecture 26 - Hilbert-Samuel Polynomial of a Local ring

Lecture 27 - Filtration on a Module

Lecture 28 - Artin-Rees Lemma

Lecture 29 - Dimension Theorem

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- Lecture 30 - Dimension Theorem (Continued...)
- Lecture 31 - Consequences of Dimension Theorem
- Lecture 32 - Generalized Krull's Principal Ideal Theorem
- Lecture 33 - Second proof of Krull's Principal Ideal Theorem
- Lecture 34 - The Spec Functor
- Lecture 35 - Prime ideals in Polynomial rings
- Lecture 36 - Characterization of Equidimensional Affine Algebra
- Lecture 37 - Connection between Regular local rings and associated graded rings
- Lecture 38 - Statement of the Jacobian Criterion for Regularity
- Lecture 39 - Hilbert function for Affine Algebra
- Lecture 40 - Hilbert Serre Theorem
- Lecture 41 - Jacobian Matrix and its Rank
- Lecture 42 - Jacobian Matrix and its Rank (Continued...)
- Lecture 43 - Proof of Jacobian Criterion
- Lecture 44 - Proof of Jacobian Criterion (Continued...)
- Lecture 45 - Preparation for Homological Dimension
- Lecture 46 - Complexes of Modules and Homology
- Lecture 47 - Projective Modules
- Lecture 48 - Homological Dimension and Projective module
- Lecture 49 - Global Dimension
- Lecture 50 - Homological characterization of Regular Local Rings (RLR)
- Lecture 51 - Homological characterization of Regular Local Rings (Continued...)
- Lecture 52 - Homological Characterization of Regular Local Rings (Continued...)
- Lecture 53 - Regular Local Rings are UFD
- Lecture 54 - RLR-Prime ideals of height 1
- Lecture 55 - Discrete Valuation Ring
- Lecture 56 - Discrete Valuation Ring (Continued...)
- Lecture 57 - Dedekind Domains
- Lecture 58 - Fractionary Ideals and Dedekind Domains
- Lecture 59 - Characterization of Dedekind Domain
- Lecture 60 - Dedekind Domains and prime factorization of ideals

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NPTEL Video Course - Mathematics - NOC:Galois Theory

Subject Co-ordinator - Prof. Dilip P. Patil

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Historical Perspectives

Lecture 2 - Examples of Fields

Lecture 3 - Polynomials and Basic properties

Lecture 4 - Polynomial Rings

Lecture 5 - Unit and Unit Groups

Lecture 6 - Division with remainder and prime factorization

Lecture 7 - Zeroes of Polynomials

Lecture 8 - Polynomial functions

Lecture 9 - Algebraically closed Fields and statement of FTA

Lecture 10 - Gauss's Theorem (Uniqueness of factorization)

Lecture 11 - Digression on Rings homomorphism, Algebras

Lecture 12 - Kernel of homomorphisms and ideals in $K[X], Z$

Lecture 13 - Algebraic elements

Lecture 14 - Examples

Lecture 15 - Minimal Polynomials

Lecture 16 - Characterization of Algebraic elements

Lecture 17 - Theorem of Kronecker

Lecture 18 - Examples

Lecture 19 - Digression on Groups

Lecture 20 - Some examples and Characteristic of a Ring

Lecture 21 - Finite subGroups of the Unit Group of a Field

Lecture 22 - Construction of Finite Fields

Lecture 23 - Digression on Group action - I

Lecture 24 - Automorphism Groups of a Field Extension

Lecture 25 - Dedekind-Artin Theorem

Lecture 26 - Galois Extension

Lecture 27 - Examples of Galois extension

Lecture 28 - Examples of Automorphism Groups

Lecture 29 - Digression on Linear Algebra

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- Lecture 30 - Minimal and Characteristic Polynomials, Norms, Trace of elements
- Lecture 31 - Primitive Element Theorem for Galois Extension
- Lecture 32 - Fundamental Theorem of Galois Theory
- Lecture 33 - Fundamental Theorem of Galois Theory (Continued...)
- Lecture 34 - Cyclotomic extensions
- Lecture 35 - Cyclotomic Polynomials
- Lecture 36 - Irreducibility of Cyclotomic Polynomials over \mathbb{Q}
- Lecture 37 - Reducibility of Cyclotomic Polynomials over Finite Fields
- Lecture 38 - Galois Group of Cyclotomic Polynomials
- Lecture 39 - Extension over a fixed Field of a finite subGroup is Galois Extension
- Lecture 40 - Digression on Group action - II
- Lecture 41 - Correspondence of Normal SubGroups and Galois sub-extensions
- Lecture 42 - Correspondence of Normal SubGroups and Galois sub-extensions (Continued...)
- Lecture 43 - Inverse Galois problem for Abelian Groups
- Lecture 44 - Elementary Symmetric Polynomials
- Lecture 45 - Fundamental Theorem on Symmetric Polynomials
- Lecture 46 - $\text{Gal}(K[X_1, X_2, \dots, X_n]/K[S_1, S_2, \dots, S_n])$
- Lecture 47 - Digression on Symmetric and Alternating Group
- Lecture 48 - Discriminant of a Polynomial
- Lecture 49 - Zeroes and Embeddings
- Lecture 50 - Normal Extensions
- Lecture 51 - Existence of Algebraic Closure
- Lecture 52 - Uniqueness of Algebraic Closure
- Lecture 53 - Proof of The Fundamental Theorem of Algebra
- Lecture 54 - Galois Group of a Polynomial
- Lecture 55 - Perfect Fields
- Lecture 56 - Embeddings
- Lecture 57 - Characterization of finite Separable extension
- Lecture 58 - Primitive Element Theorem
- Lecture 59 - Equivalence of Galois extensions and Normal-Separable extensions
- Lecture 60 - Operation of Galois Group of Polynomial on the set of zeroes
- Lecture 61 - Discriminants
- Lecture 62 - Examples for further study

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NPTEL Video Course - Mathematics - NOC:Basic Real Analysis

Subject Co-ordinator - Prof. I. K. Rana

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Real Numbers and Sequences - Part I
Lecture 2 - Real Numbers and Sequences - Part II
Lecture 3 - Real Numbers and Sequences - Part III
Lecture 4 - Convergence of Sequences - Part I
Lecture 5 - Convergence of Sequences - Part II
Lecture 6 - Convergence of Sequences - Part III
Lecture 7 - The LUB Property and Consequences - Part I
Lecture 8 - The LUB Property and Consequences - Part II
Lecture 9 - The LUB Property and Consequences - Part III
Lecture 10 - Topology of Real Numbers
Lecture 11 - Topology of Real Numbers
Lecture 12 - Topology of Real Numbers
Lecture 13 - Topology of Real Numbers
Lecture 14 - Topology of Real Numbers
Lecture 15 - Topology of Real Numbers
Lecture 16 - Topology of Real Numbers
Lecture 17 - Topology of Real Numbers
Lecture 18 - Topology of Real Numbers
Lecture 19 - Topology of Real Numbers
Lecture 20 - Topology of Real Numbers
Lecture 21 - Topology of Real Numbers
Lecture 22 - Continuity and Uniform continuity - Part I
Lecture 23 - Continuity and Uniform continuity - Part II
Lecture 24 - Continuity and Uniform continuity - Part III
Lecture 25 - Uniform continuity and connected sets - Part I
Lecture 26 - Uniform continuity and connected sets - Part II
Lecture 27 - Uniform continuity and connected sets - Part III
Lecture 28 - Connected sets and continuity - Part I
Lecture 29 - Connected sets and continuity - Part II

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- Lecture 30 - Connected sets and continuity - Part III
- Lecture 31 - Differentiability - Part I
- Lecture 32 - Differentiability - Part II
- Lecture 33 - Differentiability - Part III
- Lecture 34 - Differentiability - Part IV
- Lecture 35 - Differentiability - Part V
- Lecture 36 - Differentiability - Part VI
- Lecture 37 - Riemann Integration - Part I
- Lecture 38 - Riemann Integration - Part II
- Lecture 39 - Riemann Integration - Part III
- Lecture 40 - Riemann Integration - Part IV
- Lecture 41 - Riemann Integration - Part V
- Lecture 42 - Riemann Integration - Part VI
- Lecture 43 - Riemann Sum and Riemann Integrals - Part I
- Lecture 44 - Riemann Sum and Riemann Integrals - Part II
- Lecture 45 - Riemann Sum and Riemann Integrals - Part III
- Lecture 46 - Optimization in several variables - Part I
- Lecture 47 - Optimization in several variables - Part II
- Lecture 48 - Optimization in several variables - Part III
- Lecture 49 - Integration in several variables - Part I
- Lecture 50 - Integration in several variables - Part II
- Lecture 51 - Integration in several variables - Part III
- Lecture 52 - Change of variables - Part I
- Lecture 53 - Change of variables - Part II
- Lecture 54 - Change of variables - Part III
- Lecture 55 - Change of variables - Part IV
- Lecture 56 - Metric Spaces - Part I
- Lecture 57 - Metric Spaces - Part II
- Lecture 58 - Metric Spaces - Part III
- Lecture 59 - L^p Metrics - Part I
- Lecture 60 - L^p Metrics - Part II
- Lecture 61 - L^p Metrics - Part III
- Lecture 62 - Pointwise and Uniform convergence - Part I
- Lecture 63 - Pointwise and Uniform convergence - Part II
- Lecture 64 - Pointwise and Uniform convergence - Part III
- Lecture 65 - Pointwise and Uniform convergence - Part IV
- Lecture 66 - Series of Numbers - Part I
- Lecture 67 - Series of Numbers - Part II
- Lecture 68 - Series of Numbers - Part III

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Lecture 69 - Alternating Series and Power Series

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

NPTEL Video Course - Mathematics - NOC:A Basic Course in Number Theory

Subject Co-ordinator - Prof. Shripad Garge

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Integers
- Lecture 2 - Divisibility and primes
- Lecture 3 - Infinitude of primes
- Lecture 4 - Division algorithm and the GCD
- Lecture 5 - Computing the GCD and Euclid's lemma
- Lecture 6 - Fundamental theorem of arithmetic
- Lecture 7 - Stories around primes
- Lecture 8 - Winding up on 'Primes' and introducing Congruences'
- Lecture 9 - Basic results in congruences
- Lecture 10 - Residue classes modulo n
- Lecture 11 - Arithmetic modulo n , theory and examples
- Lecture 12 - Arithmetic modulo n , more examples
- Lecture 13 - Solving linear polynomials modulo n - I
- Lecture 14 - Solving linear polynomials modulo n - II
- Lecture 15 - Solving linear polynomials modulo n - III
- Lecture 16 - Solving linear polynomials modulo n - IV
- Lecture 17 - Chinese remainder theorem, the initial cases
- Lecture 18 - Chinese remainder theorem, the general case and examples
- Lecture 19 - Chinese remainder theorem, more examples
- Lecture 20 - Using the CRT, square roots of 1 in $\mathbb{Z}/n\mathbb{Z}$
- Lecture 21 - Wilson's theorem
- Lecture 22 - Roots of polynomials over $\mathbb{Z}/p\mathbb{Z}$
- Lecture 23 - Euler ϕ -function - I
- Lecture 24 - Euler ϕ -function - II
- Lecture 25 - Primitive roots - I
- Lecture 26 - Primitive roots - II
- Lecture 27 - Primitive roots - III
- Lecture 28 - Primitive roots - IV
- Lecture 29 - Structure of U_n - I

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

- Lecture 30 - Structure of U_n - II
- Lecture 31 - Quadratic residues
- Lecture 32 - The Legendre symbol
- Lecture 33 - Quadratic reciprocity law - I
- Lecture 34 - Quadratic reciprocity law - II
- Lecture 35 - Quadratic reciprocity law - III
- Lecture 36 - Quadratic reciprocity law - IV
- Lecture 37 - The Jacobi symbol
- Lecture 38 - Binary quadratic forms
- Lecture 39 - Equivalence of binary quadratic forms
- Lecture 40 - Discriminant of a binary quadratic form
- Lecture 41 - Reduction theory of integral binary quadratic forms
- Lecture 42 - Reduced forms up to equivalence - I
- Lecture 43 - Reduced forms up to equivalence - II
- Lecture 44 - Reduced forms up to equivalence - III
- Lecture 45 - Sums of squares - I
- Lecture 46 - Sums of squares - II
- Lecture 47 - Sums of squares - III
- Lecture 48 - Beyond sums of squares - I
- Lecture 49 - Beyond sums of squares - II
- Lecture 50 - Continued fractions - basic results
- Lecture 51 - Dirichlet's approximation theorem
- Lecture 52 - Good rational approximations
- Lecture 53 - Continued fraction expansion for real numbers - I
- Lecture 54 - Continued fraction expansion for real numbers - II
- Lecture 55 - Convergents give better approximations
- Lecture 56 - Convergents are the best approximations - I
- Lecture 57 - Convergents are the best approximations - II
- Lecture 58 - Quadratic irrationals as continued fractions
- Lecture 59 - Some basics of algebraic number theory
- Lecture 60 - Units in quadratic fields
- Lecture 61 - Units in quadratic fields
- Lecture 62 - Brahmagupta-Pell equations
- Lecture 63 - Tying some loose ends

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

NPTEL Video Course - Mathematics - NOC:Introduction to Algebraic Topology - Part I

Subject Co-ordinator - Prof. Anant R. Shastri

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Basic Problem in Topology
- Lecture 2 - Concept of homotopy
- Lecture 3 - Bird's eye-view of the course
- Lecture 4 - Path Homotopy
- Lecture 5 - Composition of paths
- Lecture 6 - Fundamental group π_1
- Lecture 7 - Computation of Fund. Group of a circle
- Lecture 8 - Computation (Continued...)
- Lecture 9 - Computation concluded
- Lecture 10 - Van-Kampen's Theorem
- Lecture 11 - Function Spaces
- Lecture 12 - Quotient Maps
- Lecture 13 - Group Actions
- Lecture 14 - Examples of Group Actions
- Lecture 15 - Assorted Results on Quotient Spaces
- Lecture 16 - Quotient Constructions Typical to Alg. Top
- Lecture 17 - Quotient Constructions (Continued...)
- Lecture 18 - Relative Homotopy
- Lecture 19 - Construction of a typical SDR
- Lecture 20 - Generalized construction of SDRs
- Lecture 21 - A theoretical application
- Lecture 22 - The Harvest
- Lecture 23 - NDR pairs
- Lecture 24 - General Remarks
- Lecture 25 - Basics of Geom. Topology
- Lecture 26 - Abstract Simplicial Complex
- Lecture 27 - Geometric Realization
- Lecture 28 - Topology on $|K|$
- Lecture 29 - Simplicial maps

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- Lecture 30 - Polyhedrons
- Lecture 31 - Point Set topological Aspects
- Lecture 32 - Barycentric Subdivision
- Lecture 33 - Finer Subdivisions
- Lecture 34 - Simplicial Approximation
- Lecture 35 - Sperner Lemma
- Lecture 36 - Invariance of domain
- Lecture 37 - Proof of controlled homotopy
- Lecture 38 - Links and Stars
- Lecture 39 - Homotopical Aspects of Simplicial Complexes
- Lecture 40 - Homotopical Aspects
- Lecture 41 - Covering Spaces and Fund. Groups
- Lecture 42 - Lifting Properties
- Lecture 43 - Homotopy Lifting
- Lecture 44 - Relation with the fund. Group
- Lecture 45 - Regular covering
- Lecture 46 - Lifting Problem
- Lecture 47 - Classification of Coverings
- Lecture 48 - Classification
- Lecture 49 - Existence of Simply connected coverings
- Lecture 50 - Construction of Simply connected covering
- Lecture 51 - Properties Shared by total space and base
- Lecture 52 - Examples
- Lecture 53 - G-coverings
- Lecture 54 - Pull-backs
- Lecture 55 - Classification of G-coverings
- Lecture 56 - Proof of classification
- Lecture 57 - Pushouts and Free products
- Lecture 58 - Existence of Free Products, pushouts
- Lecture 59 - Free Products and free groups
- Lecture 60 - Seifert-Van Kampen Theorems
- Lecture 61 - Applications
- Lecture 62 - Applications (Continued...)

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

NPTEL Video Course - Mathematics - NOC:Introduction to Algebraic Topology - Part II

Subject Co-ordinator - Prof. Anant R. Shastri

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Introduction
- Lecture 2 - Attaching cells
- Lecture 3 - Subcomplexes and Examples
- Lecture 4 - More examples
- Lecture 5 - More Examples
- Lecture 6 - Topological Properties
- Lecture 7 - Coinduced Topology
- Lecture 8 - Compactly generated topology on Products
- Lecture 9 - Product of Cell complexes
- Lecture 10 - Product of Cell complexes (Continued...)
- Lecture 11 - Partition of Unity on CW-complexes
- Lecture 12 - Partition of Unity (Continued...)
- Lecture 13 - Homotopical Aspects
- Lecture 14 - Homotopical Aspects (Continued...)
- Lecture 15 - Cellular Maps
- Lecture 16 - Cellular Maps (Continued...)
- Lecture 17 - Homotopy exact sequence of a pair
- Lecture 18 - Homotopy exact sequence of a fibration
- Lecture 19 - Categories-Definitions and Examples
- Lecture 20 - More Examples
- Lecture 21 - Functors
- Lecture 22 - Equivalence of Functors (Continued...)
- Lecture 23 - Universal Objects
- Lecture 24 - Basic Homological Algebra
- Lecture 25 - Diagram-Chasing
- Lecture 26 - Homology of Chain Complexes
- Lecture 27 - Euler Characteristics
- Lecture 28 - Singular Homology Groups
- Lecture 29 - Basic Properties of Singular Homology

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

- Lecture 30 - Excision
- Lecture 31 - Examples of Excision-Mayer Vietoris
- Lecture 32 - Applications
- Lecture 33 - Applications (Continued...)
- Lecture 34 - The Singular Simplicial Homology
- Lecture 35 - Simplicial Homology
- Lecture 36 - Simplicial Homology (Continued...)
- Lecture 37 - CW-Homology and Cellular Singular Homology
- Lecture 38 - Construction of CW-chain complex
- Lecture 39 - CW structure and CW homology of Lens Spaces
- Lecture 40 - Assorted Topics
- Lecture 41 - Some Applications of Homology
- Lecture 42 - Applications of LFT
- Lecture 43 - Jordan-Brouwer
- Lecture 44 - Proof of Lemmas
- Lecture 45 - Relation between H_1 and H_1
- Lecture 46 - All Postponed Proofs
- Lecture 47 - Proofs (Continued...)
- Lecture 48 - Definitions and Examples
- Lecture 49 - Paracompactness
- Lecture 50 - Manifolds with Boundary
- Lecture 51 - Embeddings and Homotopical Aspects
- Lecture 52 - Homotopical Aspects (Continued...)
- Lecture 53 - Classification of 1-manifolds
- Lecture 54 - Classification of 1-manifolds (Continued...)
- Lecture 55 - Triangulation of Manifolds
- Lecture 56 - Pseudo-Manifolds
- Lecture 57 - One result due to Poincaré and another due to Munkres
- Lecture 58 - Some General Remarks
- Lecture 59 - Classification of Compact Surface
- Lecture 60 - Final Reduction-Completion of the Proof
- Lecture 61 - Proof of Part B
- Lecture 62 - Orientability

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

NPTEL Video Course - Mathematics - NOC:Partial Differential Equations

Subject Co-ordinator - Prof. Sivaji Ganesh

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Partial Differential Equations - Basic concepts and Nomenclature
- Lecture 2 - First Order Partial Differential Equations- How they arise? Cauchy Problems, IVPs, IBVPs
- Lecture 3 - First order Partial Differential Equations - Geometry of Quasilinear equations
- Lecture 4 - FOPDE's - General Solutions to Linear and Semilinear equations
- Lecture 5 - First order Partial Differential Equations- Lagrange's method for Quasilinear equations
- Lecture 6 - Relation between Characteristic curves and Integral surfaces for Quasilinear equations
- Lecture 7 - Relation between Characteristic curves and Integral surfaces for Quasilinear equations
- Lecture 8 - FOPDE's - Method of characteristics for Quasilinear equations - 1
- Lecture 9 - First order Partial Differential Equations - Failure of transversality condition
- Lecture 10 - First order Partial Differential Equations - Tutorial of Quasilinear equations
- Lecture 11 - FOPDE's - General nonlinear equations 1 - Search for a characteristic direction
- Lecture 12 - FOPDE's - General nonlinear equations 2 - Characteristic direction and characteristic strip
- Lecture 13 - FOPDE's - General nonlinear equations 3 - Finding an initial strip
- Lecture 14 - FOPDE's - General nonlinear equations 4 - Local existence and uniqueness theorem
- Lecture 15 - First order Partial Differential Equations - Tutorial on General nonlinear equations
- Lecture 16 - First order Partial Differential Equations - Initial value problems for Burgers equation
- Lecture 17 - FOPDE's - Conservation laws with a view towards global solutions to Burgers equation
- Lecture 18 - Second Order Partial Differential Equations - Special Curves associated to a PDE
- Lecture 19 - Second Order Partial Differential Equations - Curves of discontinuity
- Lecture 20 - Second Order Partial Differential Equations - Classification
- Lecture 21 - SOPDE's - Canonical form for an equation of Hyperbolic type
- Lecture 22 - SOPDE's - Canonical form for an equation of Parabolic type
- Lecture 23 - SOPDE's - Canonical form for an equation of Elliptic type
- Lecture 24 - Second Order Partial Differential Equations - Characteristic Surfaces
- Lecture 25 - SOPDE's - Canonical forms for constant coefficient PDEs
- Lecture 26 - Wave Equation - A mathematical model for vibrating strings
- Lecture 27 - Wave Equation in one space dimension - d'Alembert formula
- Lecture 28 - Tutorial on One dimensional wave equation
- Lecture 29 - Wave Equation in d space dimensions - Equivalent Cauchy problems via Spherical means

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- Lecture 30 - Cauchy problem for Wave Equation in 3 space dimensions - Poisson-Kirchhoff formulae
- Lecture 31 - Cauchy problem for Wave Equation in 2 space dimensions - Hadamard's method of descent
- Lecture 32 - Nonhomogeneous Wave Equation - Duhamel principle
- Lecture 33 - Wellposedness of Cauchy problem for Wave Equation
- Lecture 34 - Wave Equation on an interval in? - Solution to an IBVP from first principles
- Lecture 35 - Tutorial on IBVPs for wave equation
- Lecture 36 - IBVP for Wave Equation - Separation of Variables Method
- Lecture 37 - Tutorial on Separation of variables method for wave equation
- Lecture 38 - Qualitative analysis of Wave equation - Parallelogram identity
- Lecture 39 - Qualitative analysis of Wave equation - Domain of dependence, domain of influence
- Lecture 40 - Qualitative analysis of Wave equation - Causality Principle, Finite speed of propagation
- Lecture 41 - Qualitative analysis of Wave equation - Uniqueness by Energy method
- Lecture 42 - Qualitative analysis of Wave equation - Huygens Principle
- Lecture 43 - Qualitative analysis of Wave equation - Generalized solutions to Wave equation
- Lecture 44 - Qualitative analysis of Wave equation - Propagation of waves
- Lecture 45 - Laplace equation - Associated Boundary value problems
- Lecture 46 - Laplace equation - Fundamental solution
- Lecture 47 - Dirichlet BVP for Laplace equation - Green's function and Poisson's formula
- Lecture 48 - Laplace equation - Weak maximum principle and its applications
- Lecture 49 - Laplace equation - Dirichlet BVP on a disk in R^2 for Laplace equations
- Lecture 50 - Tutorial 1 on Laplace equation
- Lecture 51 - Laplace equation - Mean value property
- Lecture 52 - Laplace equation - More qualitative properties
- Lecture 53 - Laplace equation - Strong Maximum Principle and Dirichlet Principle
- Lecture 54 - Tutorial 2 on Laplace equation
- Lecture 55 - Cauchy Problem for Heat Equation - 1
- Lecture 56 - Cauchy Problem for Heat Equation - 2
- Lecture 57 - IBVP for Heat equation Subtitle: Method of Separation of Variables
- Lecture 58 - Maximum principle for heat equation
- Lecture 59 - Tutorial on heat equation
- Lecture 60 - Heat equation Subheading : Infinite speed of propagation, Energy, Backward Problem

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

NPTEL Video Course - Mathematics - NOC:An Introduction to Point-Set-Topology - Part I

Subject Co-ordinator - Prof. Anant R Shastri

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction
Lecture 2 - Introduction
Lecture 3 - Introduction
Lecture 4 - Introduction
Lecture 5 - Introduction
Lecture 6 - Introduction
Lecture 7 - Introduction
Lecture 8 - Introduction
Lecture 9 - Introduction
Lecture 10 - Introduction
Lecture 11 - Introduction
Lecture 12 - Introduction
Lecture 13 - Introduction
Lecture 14 - Introduction
Lecture 15 - Introduction
Lecture 16 - Introduction
Lecture 17 - Introduction
Lecture 18 - Introduction
Lecture 19 - Introduction
Lecture 20 - Introduction
Lecture 21 - Introduction
Lecture 22 - Creating New Spaces
Lecture 23 - Creating New Spaces
Lecture 24 - Creating New Spaces
Lecture 25 - Creating New Spaces
Lecture 26 - Creating New Spaces
Lecture 27 - Creating New Spaces
Lecture 28 - Creating New Spaces
Lecture 29 - Creating New Spaces

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Lecture 30 - Creating New Spaces
Lecture 31 - Creating New Spaces
Lecture 32
Lecture 33
Lecture 34
Lecture 35
Lecture 36
Lecture 37
Lecture 38 - Smallness Properties of Topological Spaces
Lecture 39 - Smallness Properties of Topological Spaces
Lecture 40 - Smallness Properties of Topological Spaces
Lecture 41 - Smallness Properties of Topological Spaces
Lecture 42 - Smallness Properties of Topological Spaces
Lecture 43 - Smallness Properties of Topological Spaces
Lecture 44 - Smallness Properties of Topological Spaces
Lecture 45 - Smallness Properties of Topological Spaces
Lecture 46 - Smallness Properties of Topological Spaces
Lecture 47 - Largeness properties
Lecture 48 - Largeness properties
Lecture 49 - Largeness properties
Lecture 50 - Largeness properties
Lecture 51 - Largeness properties
Lecture 52 - Largeness properties
Lecture 53 - Largeness properties
Lecture 54 - Largeness properties
Lecture 55 - Largeness properties
Lecture 56
Lecture 57
Lecture 58
Lecture 59
Lecture 60
Lecture 61

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NPTEL Video Course - Mathematics - Stochastic Processes

Subject Co-ordinator - Dr. S. Dharmaraja

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction to Stochastic Processes
- Lecture 2 - Introduction to Stochastic Processes (Continued.)
- Lecture 3 - Problems in Random Variables and Distributions
- Lecture 4 - Problems in Sequences of Random Variables
- Lecture 5 - Definition, Classification and Examples
- Lecture 6 - Simple Stochastic Processes
- Lecture 7 - Stationary Processes
- Lecture 8 - Autoregressive Processes
- Lecture 9 - Introduction, Definition and Transition Probability Matrix
- Lecture 10 - Chapman-Kolmogorov Equations
- Lecture 11 - Classification of States and Limiting Distributions
- Lecture 12 - Limiting and Stationary Distributions
- Lecture 13 - Limiting Distributions, Ergodicity and Stationary Distributions
- Lecture 14 - Time Reversible Markov Chain, Application of Irreducible Markov Chain in Queueing Models
- Lecture 15 - Reducible Markov Chains
- Lecture 16 - Definition, Kolmogorov Differential Equations and Infinitesimal Generator Matrix
- Lecture 17 - Limiting and Stationary Distributions, Birth Death Processes
- Lecture 18 - Poisson Processes
- Lecture 19 - M/M/1 Queueing Model
- Lecture 20 - Simple Markovian Queueing Models
- Lecture 21 - Queueing Networks
- Lecture 22 - Communication Systems
- Lecture 23 - Stochastic Petri Nets
- Lecture 24 - Conditional Expectation and Filtration
- Lecture 25 - Definition and Simple Examples
- Lecture 26 - Definition and Properties
- Lecture 27 - Processes Derived from Brownian Motion
- Lecture 28 - Stochastic Differential Equations
- Lecture 29 - Ito Integrals

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- Lecture 30 - Ito Formula and its Variants
- Lecture 31 - Some Important SDE`s and Their Solutions
- Lecture 32 - Renewal Function and Renewal Equation
- Lecture 33 - Generalized Renewal Processes and Renewal Limit Theorems
- Lecture 34 - Markov Renewal and Markov Regenerative Processes
- Lecture 35 - Non Markovian Queues
- Lecture 36 - Non Markovian Queues Cont,,
- Lecture 37 - Application of Markov Regenerative Processes
- Lecture 38 - Galton-Watson Process
- Lecture 39 - Markovian Branching Process

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

NPTEL Video Course - Mathematics - NOC:Stochastic Processes - 1

Subject Co-ordinator - Dr. S. Dharmaraja

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction and motivation for studying stochastic processes
- Lecture 2 - Probability space and conditional probability
- Lecture 3 - Random variable and cumulative distributive function
- Lecture 4 - Discrete Uniform Distribution, Binomial Distribution, Geometric Distribution, Continuous Uniform
- Lecture 5 - Joint Distribution of Random Variables
- Lecture 6 - Independent Random Variables, Covariance and Correlation Coefficient and Conditional Distribution
- Lecture 7 - Conditional Expectation and Covariance Matrix
- Lecture 8 - Generating Functions, Law of Large Numbers and Central Limit Theorem
- Lecture 9 - Problems in Random variables and Distributions
- Lecture 10 - Problems in Random variables and Distributions (Continued...)
- Lecture 11 - Problems in Random variables and Distributions (Continued...)
- Lecture 12 - Problems in Random variables and Distributions (Continued...)
- Lecture 13 - Problems in Sequences of Random Variables
- Lecture 14 - Problems in Sequences of Random Variables (Continued...)
- Lecture 15 - Problems in Sequences of Random Variables (Continued...)
- Lecture 16 - Problems in Sequences of Random Variables (Continued...)
- Lecture 17 - Definition of Stochastic Processes, Parameter and State Spaces
- Lecture 18 - Classification of Stochastic Processes
- Lecture 19 - Examples of Classification of Stochastic Processes
- Lecture 20 - Examples of Classification of Stochastic Processes (Continued...)
- Lecture 21 - Bernoulli Process
- Lecture 22 - Poisson Process
- Lecture 23 - Poisson Process (Continued...)
- Lecture 24 - Simple Random Walk and Population Processes
- Lecture 25 - Introduction to Discrete time Markov Chain
- Lecture 26 - Introduction to Discrete time Markov Chain (Continued...)
- Lecture 27 - Examples of Discrete time Markov Chain
- Lecture 28 - Examples of Discrete time Markov Chain (Continued...)
- Lecture 29 - Introduction to Chapman-Kolmogorov equations

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- Lecture 30 - State Transition Diagram and Examples
- Lecture 31 - Examples
- Lecture 32 - Introduction to Classification of States and Periodicity
- Lecture 33 - Closed set of States and Irreducible Markov Chain
- Lecture 34 - First Passage time and Mean Recurrence Time
- Lecture 35 - Recurrent State and Transient State
- Lecture 36 - Introduction and example of Classification of states
- Lecture 37 - Example of Classification of states (Continued...)
- Lecture 38 - Example of Classification of states (Continued...)
- Lecture 39 - Example of Classification of states (Continued...)
- Lecture 40 - Introduction and Limiting Distribution
- Lecture 41 - Example of Limiting Distribution and Ergodicity
- Lecture 42 - Stationary Distribution and Examples
- Lecture 43 - Examples of Stationary Distributions
- Lecture 44 - Time Reversible Markov Chain and Examples
- Lecture 45 - Definition of Reducible Markov Chains and Types of Reducible Markov Chains
- Lecture 46 - Stationary Distributions and Types of Reducible Markov chains
- Lecture 47 - Type of Reducible Markov Chains (Continued...)
- Lecture 48 - Gambler's Ruin Problem
- Lecture 49 - Introduction to Continuous time Markov Chain
- Lecture 50 - Waiting time Distribution
- Lecture 51 - Chapman-Kolmogorov Equation
- Lecture 52 - Infinitesimal Generator Matrix
- Lecture 53 - Introduction and Example Of Continuous time Markov Chain
- Lecture 54 - Limiting and Stationary Distributions
- Lecture 55 - Time reversible CTMC and Birth Death Process
- Lecture 56 - Steady State Distributions, Pure Birth Process and Pure Death Process
- Lecture 57 - Introduction to Poisson Process
- Lecture 58 - Definition of Poisson Process
- Lecture 59 - Superposition and Deposition of Poisson Process
- Lecture 60 - Compound Poisson Process and Examples
- Lecture 61 - Introduction to Queueing Systems and Kendall Notations
- Lecture 62 - M/M/1 Queueing Model
- Lecture 63 - Little's Law, Distribution of Waiting Time and Response Time
- Lecture 64 - Burke's Theorem and Simulation of M/M/1 queueing Model
- Lecture 65 - M/M/c Queueing Model
- Lecture 66 - M/M/1/N Queueing Model
- Lecture 67 - M/M/c/K Model, M/M/c/c Loss System, M/M/? Self Service System
- Lecture 68 - Transient Solution of Finite Birth Death Process and Finite Source Markovian Queueing Model

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- Lecture 69 - Queueing Networks Characteristics and Types of Queueing Networks
- Lecture 70 - Tandem Queueing Networks
- Lecture 71 - Stationary Distribution and Open Queueing Network
- Lecture 72 - Jackson's Theorem, Closed Queueing Networks, Gordon and Newell Results
- Lecture 73 - Wireless Handoff Performance Model and System Description
- Lecture 74 - Description of 3G Cellular Networks and Queueing Model
- Lecture 75 - Simulation of Queueing Systems
- Lecture 76 - Definition and Basic Components of Petri Net and Reachability Analysis
- Lecture 77 - Arc Extensions in Petri Net, Stochastic Petri Nets and examples

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

NPTEL Video Course - Mathematics - NOC:Stochastic Processes

Subject Co-ordinator - Dr. S. Dharmaraja

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction and motivation for studying stochastic processes
- Lecture 2 - Probability space and conditional probability
- Lecture 3 - Random variable and cumulative distributive function
- Lecture 4 - Discrete Uniform Distribution, Binomial Distribution, Geometric Distribution, Continuous Uniform
- Lecture 5 - Joint Distribution of Random Variables
- Lecture 6 - Independent Random Variables, Covariance and Correlation Coefficient and Conditional Distribution
- Lecture 7 - Conditional Expectation and Covariance Matrix
- Lecture 8 - Generating Functions, Law of Large Numbers and Central Limit Theorem
- Lecture 9 - Problems in Random variables and Distributions
- Lecture 10 - Problems in Random variables and Distributions (Continued...)
- Lecture 11 - Problems in Random variables and Distributions (Continued...)
- Lecture 12 - Problems in Random variables and Distributions (Continued...)
- Lecture 13 - Problems in Sequences of Random Variables
- Lecture 14 - Problems in Sequences of Random Variables (Continued...)
- Lecture 15 - Problems in Sequences of Random Variables (Continued...)
- Lecture 16 - Problems in Sequences of Random Variables (Continued...)
- Lecture 17 - Definition of Stochastic Processes, Parameter and State Spaces
- Lecture 18 - Classification of Stochastic Processes
- Lecture 19 - Examples of Classification of Stochastic Processes
- Lecture 20 - Examples of Classification of Stochastic Processes (Continued...)
- Lecture 21 - Bernoulli Process
- Lecture 22 - Poisson Process
- Lecture 23 - Poisson Process (Continued...)
- Lecture 24 - Simple Random Walk and Population Processes
- Lecture 25 - Introduction to Discrete time Markov Chain
- Lecture 26 - Introduction to Discrete time Markov Chain (Continued...)
- Lecture 27 - Examples of Discrete time Markov Chain
- Lecture 28 - Examples of Discrete time Markov Chain (Continued...)
- Lecture 29 - Introduction to Chapman-Kolmogorov equations

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- Lecture 36 - Introduction and example of Classification of states
- Lecture 37 - Example of Classification of states (Continued...)
- Lecture 38 - Example of Classification of states (Continued...)
- Lecture 39 - Example of Classification of states (Continued...)
- Lecture 40 - Introduction and Limiting Distribution
- Lecture 41 - Example of Limiting Distribution and Ergodicity
- Lecture 42 - Stationary Distribution and Examples
- Lecture 43 - Examples of Stationary Distributions
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- Lecture 45 - Definition of Reducible Markov Chains and Types of Reducible Markov Chains
- Lecture 46 - Stationary Distributions and Types of Reducible Markov chains
- Lecture 47 - Type of Reducible Markov Chains (Continued...)
- Lecture 48 - Gambler's Ruin Problem
- Lecture 49 - Introduction to Continuous time Markov Chain
- Lecture 50 - Waiting time Distribution
- Lecture 51 - Chapman-Kolmogorov Equation
- Lecture 52 - Infinitesimal Generator Matrix
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- Lecture 58 - Definition of Poisson Process
- Lecture 59 - Superposition and Deposition of Poisson Process
- Lecture 60 - Compound Poisson Process and Examples
- Lecture 61 - Introduction to Queueing Systems and Kendall Notations
- Lecture 62 - M/M/1 Queueing Model
- Lecture 63 - Little's Law, Distribution of Waiting Time and Response Time
- Lecture 64 - Burke's Theorem and Simulation of M/M/1 queueing Model
- Lecture 65 - M/M/c Queueing Model
- Lecture 66 - M/M/1/N Queueing Model
- Lecture 67 - M/M/c/K Model, M/M/c/c Loss System, M/M/? Self Service System
- Lecture 68 - Transient Solution of Finite Birth Death Process and Finite Source Markovian Queueing Model

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- Lecture 74 - Description of 3G Cellular Networks and Queueing Model
- Lecture 75 - Simulation of Queueing Systems
- Lecture 76 - Definition and Basic Components of Petri Net and Reachability Analysis
- Lecture 77 - Arc Extensions in Petri Net, Stochastic Petri Nets and examples
- Lecture 78 - Generalized Stochastic Petri Net
- Lecture 79 - Generalized Stochastic Petri Net (Continued...)
- Lecture 80 - Conditional Expectation and Examples
- Lecture 81 - Filtration in Discrete time
- Lecture 82 - Remarks of Conditional Expectation and Adaptability
- Lecture 83 - Definition and Examples of Martingale
- Lecture 84 - Examples of Martingale (Continued...)
- Lecture 85 - Examples of Martingale (Continued...)
- Lecture 86 - Doob's Martingale Process, Sub martingale and Super Martingale
- Lecture 87 - Definition of Brownian Motion
- Lecture 88 - Definition of Brownian Motion (Continued...)
- Lecture 89 - Properties of Brownian Motion
- Lecture 90 - Processes Derived from Brownian Motion
- Lecture 91 - Processes Derived from Brownian Motion (Continued...)
- Lecture 92 - Processes Derived from Brownian Motion (Continued...)
- Lecture 93 - Stochastic Differential Equations
- Lecture 94 - Stochastic Differential Equations (Continued...)
- Lecture 95 - Stochastic Differential Equations (Continued...)
- Lecture 96 - Ito Integrals
- Lecture 97 - Ito Integrals (Continued...)
- Lecture 98 - Ito Integrals (Continued...)
- Lecture 99 - Renewal Function and Renewal Equation
- Lecture 100 - Renewal Function and Renewal Equation (Continued...)
- Lecture 101 - Renewal Function and Renewal Equation (Continued...)
- Lecture 102 - Generalized Renewal Processes and Renewal Limit Theorems
- Lecture 103 - Generalized Renewal Processes and Renewal Limit Theorems (Continued...)
- Lecture 104 - Generalized Renewal Processes and Renewal Limit Theorems (Continued...)
- Lecture 105 - Markov Renewal and Markov Regenerative Processes
- Lecture 106 - Markov Renewal and Markov Regenerative Processes (Continued...)
- Lecture 107 - Markov Renewal and Markov Regenerative Processes (Continued...)

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- Lecture 108 - Markov Renewal and Markov Regenerative Processes (Continued...)
- Lecture 109 - Non Markovian Queues
- Lecture 110 - Non Markovian Queues (Continued...)
- Lecture 111 - Non Markovian Queues (Continued...)
- Lecture 112 - Stationary Processes
- Lecture 113 - Stationary Processes (Continued...)
- Lecture 114 - Stationary Processes (Continued...)
- Lecture 115 - Stationary Processes (Continued...) and Ergodicity
- Lecture 116 - G1/M/1 queue
- Lecture 117 - G1/M/1 queue (Continued...)
- Lecture 118 - G1/M/1/N queue and examples
- Lecture 119 - Galton-Watson Process
- Lecture 120 - Examples and Theorems
- Lecture 121 - Theorems and Examples (Continued...)
- Lecture 122 - Markov Branching Process
- Lecture 123 - Markov Branching Process Theorems and Properties
- Lecture 124 - Markov Branching Process Theorems and Properties (Continued...)

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

NPTEL Video Course - Mathematics - NOC:Chaotic Dynamical Systems

Subject Co-ordinator - Dr. Anima Nagar

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - The beginning
- Lecture 2 - Elementary Concepts
- Lecture 3 - Elementary Concepts (Continued...)
- Lecture 4 - More on orbits
- Lecture 5 - Periods of Periodic Points
- Lecture 6 - Scrambled Sets
- Lecture 7 - Sensitive Dependence on Initial Conditions
- Lecture 8 - A Population Dynamics Model
- Lecture 9 - Bifurcations
- Lecture 10 - Nonlinear Systems
- Lecture 11 - Horseshoe Attractor
- Lecture 12 - Dynamics of the Horseshoe Attractor
- Lecture 13 - Recurrence
- Lecture 14 - Recurrence (Continued...)
- Lecture 15 - Transitivity
- Lecture 16 - Devaney's Chaos
- Lecture 17 - Transitivity = Chaos on Intervals
- Lecture 18 - Stronger forms of Transitivity
- Lecture 19 - Chaotic Properties of Mixing Systems
- Lecture 20 - Weakly Mixing and Chaos
- Lecture 21 - Strongly Transitive Systems
- Lecture 22 - Strongly Transitive Systems (Continued...)
- Lecture 23 - Introduction to Symbolic Dynamics
- Lecture 24 - Shift Spaces
- Lecture 25 - Subshifts of Finite Type
- Lecture 26 - Subshifts of Finite Type (Continued...), Chaotic Dynamical Systems
- Lecture 27 - Measuring Chaos - Topological Entropy
- Lecture 28 - Topological Entropy - Adler's Version
- Lecture 29 - Bowen's Definition of Topological Entropy

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- Lecture 30 - Equivalence of the two definitions of Topological Entropy
- Lecture 31 - Linear Systems in Two Dimensions
- Lecture 32 - Asymptotic Properties of Orbits of Linear Transformation in \mathbb{R}^2
- Lecture 33 - Hyperbolic Toral Automorphisms
- Lecture 34 - Chaos in Toral Automorphisms
- Lecture 35 - Chaotic Attractors of Henon Maps

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

NPTEL Video Course - Mathematics - NOC:Introduction to Probability Theory and Stochastic Processes

Subject Co-ordinator - Dr. S. Dharmaraja

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Random experiment, sample space, axioms of probability, probability space
- Lecture 2 - Random experiment, sample space, axioms of probability, probability space (Continued...)
- Lecture 3 - Random experiment, sample space, axioms of probability, probability space (Continued...)
- Lecture 4 - Conditional probability, independence of events.
- Lecture 5 - Multiplication rule, total probability rule, Bayes's theorem.
- Lecture 6 - Definition of Random Variable, Cumulative Distribution Function
- Lecture 7 - Definition of Random Variable, Cumulative Distribution Function (Continued...)
- Lecture 8 - Definition of Random Variable, Cumulative Distribution Function (Continued...)
- Lecture 9 - Type of Random Variables, Probability Mass Function, Probability Density Function
- Lecture 10 - Type of Random Variables, Probability Mass Function, Probability Density Function (Continued...)
- Lecture 11 - Distribution of Function of Random Variables
- Lecture 12 - Mean and Variance
- Lecture 13 - Mean and Variance (Continued...)
- Lecture 14 - Higher Order Moments and Moments Inequalities
- Lecture 15 - Higher Order Moments and Moments Inequalities (Continued...)
- Lecture 16 - Generating Functions
- Lecture 17 - Generating Functions (Continued...)
- Lecture 18 - Common Discrete Distributions
- Lecture 19 - Common Discrete Distributions (Continued...)
- Lecture 20 - Common Continuous Distributions
- Lecture 21 - Common Continuous Distributions (Continued...)
- Lecture 22 - Applications of Random Variable
- Lecture 23 - Applications of Random Variable (Continued...)
- Lecture 24 - Random vector and joint distribution
- Lecture 25 - Joint probability mass function
- Lecture 26 - Joint probability density function
- Lecture 27 - Independent random variables
- Lecture 28 - Independent random variables (Continued...)
- Lecture 29 - Functions of several random variables

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

- Lecture 30 - Functions of several random variables (Continued...)
- Lecture 31 - Some important results
- Lecture 32 - Order statistics
- Lecture 33 - Conditional distributions
- Lecture 34 - Random sum
- Lecture 35 - Moments and Covariance
- Lecture 36 - Variance Covariance matrix
- Lecture 37 - Multivariate Normal distribution
- Lecture 38 - Probability generating function and Moment generating function
- Lecture 39 - Correlation coefficient
- Lecture 40 - Conditional Expectation
- Lecture 41 - Conditional Expectation (Continued...)
- Lecture 42 - Modes of Convergence
- Lecture 43 - Mode of Convergence (Continued...)
- Lecture 44 - Law of Large Numbers
- Lecture 45 - Central Limit Theorem
- Lecture 46 - Central Limit Theorem (Continued...)
- Lecture 47 - Motivation for Stochastic Processes
- Lecture 48 - Definition of a Stochastic Process
- Lecture 49 - Classification of Stochastic Processes
- Lecture 50 - Examples of Stochastic Process
- Lecture 51 - Examples Of Stochastic Process (Continued...)
- Lecture 52 - Bernoulli Process
- Lecture 53 - Poisson Process
- Lecture 54 - Poisson Process (Continued...)
- Lecture 55 - Simple Random Walk
- Lecture 56 - Time Series and Related Definitions
- Lecture 57 - Strict Sense Stationary Process
- Lecture 58 - Wide Sense Stationary Process and Examples
- Lecture 59 - Examples of Stationary Processes (Continued...)
- Lecture 60 - Discrete Time Markov Chain (DTMC)
- Lecture 61 - DTMC (Continued...)
- Lecture 62 - Examples of DTMC
- Lecture 63 - Examples of DTMC (Continued...)
- Lecture 64 - Chapman-Kolmogorov equations and N-step transition matrix
- Lecture 65 - Examples based on N-step transition matrix
- Lecture 66 - Examples (Continued...)
- Lecture 67 - Classification of states
- Lecture 68 - Classification of states (Continued...)

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- Lecture 69 - Calculation of N-Step - 9
- Lecture 70 - Calculation of N-Step - 10
- Lecture 71 - Limiting and Stationary distributions
- Lecture 72 - Limiting and Stationary distributions (Continued...)
- Lecture 73 - Continuous time Markov chain (CTMC)
- Lecture 74 - CTMC (Continued...)
- Lecture 75 - State transition diagram and Chapman-Kolmogorov equation
- Lecture 76 - Infinitesimal generator and Kolmogorov differential equations
- Lecture 77 - Limiting distribution
- Lecture 78 - Limiting and Stationary distributions - 1
- Lecture 79 - Birth death process
- Lecture 80 - Birth death process (Continued...)
- Lecture 81 - Poisson process - 1
- Lecture 82 - Poisson process (Continued...)
- Lecture 83 - Poisson process (Continued...)
- Lecture 84 - Non-homogeneous and compound Poisson process
- Lecture 85 - Introduction to Queueing Models and Kendall Notation
- Lecture 86 - M/M/1 Queueing Model
- Lecture 87 - M/M/1 Queueing Model (Continued...)
- Lecture 88 - M/M/1 Queueing Model and Burke's Theorem
- Lecture 89 - M/M/c Queueing Model
- Lecture 90 - M/M/c (Continued...) and M/M/1/N Model
- Lecture 91 - Other Markovian Queueing Models
- Lecture 92 - Transient Solution of Finite Capacity Markovian Queues

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

NPTEL Video Course - Mathematics - NOC:Statistical Inference

Subject Co-ordinator - Prof. Nilladri Chatterjee

Co-ordinating Institute - IIT - Delhi

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

Lecture 1 - Statistical Inference - 1
Lecture 2 - Statistical Inference - 2
Lecture 3 - Statistical Inference - 3
Lecture 4 - Statistical Inference - 4
Lecture 5 - Statistical Inference - 5
Lecture 6 - Statistical Inference - 6
Lecture 7 - Statistical Inference - 7
Lecture 8 - Statistical Inference - 8
Lecture 9 - Statistical Inference - 9
Lecture 10 - Statistical Inference - 10
Lecture 11 - Statistical Inference - 11
Lecture 12 - Statistical Inference - 12
Lecture 13 - Statistical Inference - 13
Lecture 14 - Statistical Inference - 14
Lecture 15 - Statistical Inference - 15
Lecture 16 - Stasistical Inference - 16
Lecture 17 - Stasistical Inference - 17
Lecture 18 - Statistical Inference - 18
Lecture 19 - Stasistical Inference - 19
Lecture 20 - Stasistical Inference - 20
Lecture 21 - Stasistical Inference - 21

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

NPTEL Video Course - Mathematics - NOC: Integral Transforms and their Applications

Subject Co-ordinator - Prof. Sarthok Sircar

Co-ordinating Institute - IIT - Delhi

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

Lecture 1 - Introduction to Fourier Transforms - Part 1
Lecture 2 - Introduction to Fourier Transforms - Part 2
Lecture 3 - Introduction to Fourier Transforms - Part 3
Lecture 4 - Properties of Fourier transforms, Shannon Sampling Theorem, Gibb's Phenomena - Part 1
Lecture 5 - Properties of Fourier transforms, Shannon Sampling Theorem, Gibb's Phenomena - Part 2
Lecture 6 - Properties of Fourier transforms, Shannon Sampling Theorem, Gibb's Phenomena - Part 3
Lecture 7 - Applications of Fourier Transforms - Part 1
Lecture 8 - Applications of Fourier Transforms - Part 2
Lecture 9 - Applications of Fourier Transforms - Part 3
Lecture 10 - Introduction to Laplace Transforms - Part 1
Lecture 11 - Introduction to Laplace Transforms - Part 2
Lecture 12 - Introduction to Laplace Transforms - Part 3
Lecture 13 - Inverse Laplace Transform, Initial and Final Value Theorems - Part 1
Lecture 14 - Inverse Laplace Transform, Initial and Final Value Theorems - Part 2
Lecture 15 - Inverse Laplace Transform, Initial and Final Value Theorems - Part 3
Lecture 16 - Applications of Laplace Transforms - Part 1
Lecture 17 - Applications of Laplace Transforms - Part 2
Lecture 18 - Applications of Laplace Transforms - Part 3
Lecture 19 - Applications of Laplace Transforms (Continued) - Part 1
Lecture 20 - Applications of Laplace Transforms (Continued) - Part 2
Lecture 21 - Applications of Laplace Transforms (Continued) - Part 3
Lecture 22 - Applications of Fourier-Laplace Transforms - Part 1
Lecture 23 - Applications of Fourier-Laplace Transforms - Part 2
Lecture 24 - Applications of Fourier-Laplace Transforms - Part 3
Lecture 25 - Introduction to Hankel Transforms - Part 1
Lecture 26 - Introduction to Hankel Transforms - Part 2
Lecture 27 - Introduction to Hankel Transforms - Part 3
Lecture 28 - Introduction to Mellin Transforms - Part 1
Lecture 29 - Introduction to Mellin Transforms - Part 2

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- Lecture 30 - Introduction to Mellin Transforms - Part 3
- Lecture 31 - Introduction to Hilbert Transforms - Part 1
- Lecture 32 - Introduction to Hilbert Transforms - Part 2
- Lecture 33 - Introduction to Hilbert Transforms - Part 3
- Lecture 34 - Applications of Hilbert Transforms, Introduction to Stieltjes Transform - Part 1
- Lecture 35 - Applications of Hilbert Transforms, Introduction to Stieltjes Transform - Part 2
- Lecture 36 - Applications of Hilbert Transforms, Introduction to Stieltjes Transform - Part 3
- Lecture 37 - Applications of Stieltjes Transform, Generalized Stieltjes Transform - Part 1
- Lecture 38 - Applications of Stieltjes Transform, Generalized Stieltjes Transform - Part 2
- Lecture 39 - Applications of Stieltjes Transform, Generalized Stieltjes Transform - Part 3
- Lecture 40 - Introduction to Legendre Transform - Part 1
- Lecture 41 - Introduction to Legendre Transform - Part 2
- Lecture 42 - Introduction to Legendre Transform - Part 3
- Lecture 43 - Introduction to Z-transform - Part 1
- Lecture 44 - Introduction to Z-transform - Part 2
- Lecture 45 - Introduction to Z-transform - Part 3
- Lecture 46 - Inverse Z-transform, Applications of Z-Transform - Part 1
- Lecture 47 - Inverse Z-transform, Applications of Z-Transform - Part 2
- Lecture 48 - Inverse Z-transform, Applications of Z-Transform - Part 3
- Lecture 49 - Introduction to Radon Transform - Part 1
- Lecture 50 - Introduction to Radon Transform - Part 2
- Lecture 51 - Introduction to Radon Transform - Part 3
- Lecture 52 - Inverse Radon Transform, Applications to Radon Transform - Part 1
- Lecture 53 - Inverse Radon Transform, Applications to Radon Transform - Part 2
- Lecture 54 - Inverse Radon Transform, Applications to Radon Transform - Part 3
- Lecture 55 - Introduction to Fractional Calculus - Part 1
- Lecture 56 - Introduction to Fractional Calculus - Part 2
- Lecture 57 - Introduction to Fractional Calculus - Part 3
- Lecture 58 - Fractional ODEs, Abel's Integral Equations - Part 1
- Lecture 59 - Fractional ODEs, Abel's Integral Equations - Part 2
- Lecture 60 - Fractional ODEs, Abel's Integral Equations - Part 3
- Lecture 61 - Fractional PDEs - Part 1
- Lecture 62 - Fractional PDEs - Part 2
- Lecture 63 - Fractional PDEs - Part 3
- Lecture 64 - Fractional ODEs and PDEs (Continued) - Part 1
- Lecture 65 - Fractional ODEs and PDEs (Continued) - Part 2
- Lecture 66 - Fractional ODEs and PDEs (Continued) - Part 3
- Lecture 67 - Introduction to Wavelet Transform - Part 1
- Lecture 68 - Introduction to Wavelet Transform - Part 2

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

- Lecture 69 - Introduction to Wavelet Transform - Part 3
- Lecture 70 - Discrete Haar, Shanon and Debauchies Wavelet - Part 1
- Lecture 71 - Discrete Haar, Shanon and Debauchies Wavelet - Part 2
- Lecture 72 - Discrete Haar, Shanon and Debauchies Wavelet - Part 3

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

NPTEL Video Course - Mathematics - NOC:Introduction to Fuzzy Set Theory, Arithmetic and Logic

Subject Co-ordinator - Prof. Nilladri Chatterjee

Co-ordinating Institute - IIT - Delhi

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

Lecture 1 - Fuzzy Sets Arithmetic and Logic - 1
Lecture 2 - Fuzzy Sets Arithmetic and Logic - 2
Lecture 3 - Fuzzy Sets Arithmetic and Logic - 3
Lecture 4 - Fuzzy Sets Arithmetic and Logic - 4
Lecture 5 - Fuzzy Sets Arithmetic and Logic - 5
Lecture 6 - Fuzzy Sets Arithmetic and Logic - 6
Lecture 7 - Fuzzy Sets Arithmetic and Logic - 7
Lecture 8 - Fuzzy Sets Arithmetic and Logic - 8
Lecture 9 - Fuzzy Sets Arithmetic and Logic - 9
Lecture 10 - Fuzzy Sets Arithmetic and Logic - 10
Lecture 11 - Fuzzy Sets Arithmetic and Logic - 11
Lecture 12 - Fuzzy Sets Arithmetic and Logic - 12
Lecture 13 - Fuzzy Sets Arithmetic and Logic - 13
Lecture 14 - Fuzzy Sets Arithmetic and Logic - 14
Lecture 15 - Fuzzy Sets Arithmetic and Logic - 15
Lecture 16 - Fuzzy Sets Arithmetic and Logic - 16
Lecture 17 - Fuzzy Sets Arithmetic and Logic - 17
Lecture 18 - Fuzzy Sets Arithmetic and Logic - 18
Lecture 19 - Fuzzy Sets Arithmetic and Logic - 19
Lecture 20 - Fuzzy Sets Arithmetic and Logic - 20
Lecture 21 - Fuzzy Sets Arithmetic and Logic - 21
Lecture 22 - Fuzzy Sets Arithmetic and Logic - 22
Lecture 23 - Fuzzy Sets Arithmetic and Logic - 23
Lecture 24 - Fuzzy Sets Arithmetic and Logic - 24
Lecture 25 - Fuzzy Sets Arithmetic and Logic - 25
Lecture 26 - Fuzzy Sets Arithmetic and Logic - 26
Lecture 27 - Fuzzy Sets Arithmetic and Logic - 27
Lecture 28 - Fuzzy Sets Arithmetic and Logic - 28
Lecture 29 - Fuzzy Sets Arithmetic and Logic - 29

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Lecture 30 - Fuzzy Sets Arithmetic and Logic - 30

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

NPTEL Video Course - Mathematics - NOC:Introduction to Methods of Applied Mathematics

Subject Co-ordinator - Prof. Vivek Kumar Aggarwal

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction to First Order Differential Equations
- Lecture 2 - Introduction to First Order Differential Equations (Continued...)
- Lecture 3 - Introduction to Second Order Linear Differential Equations
- Lecture 4 - Second Order Linear Differential Equations With Constant Coefficients
- Lecture 5 - Second Order Linear Differential Equations With Constant Coefficients (Continued...)
- Lecture 6 - Second Order Linear Differential Equations With Variable Coefficients
- Lecture 7 - Factorization of Second order Differential Operator and Euler Cauchy Equation
- Lecture 8 - Power Series Solution of General Differential Equation
- Lecture 9 - Green's function
- Lecture 10 - Method of Green's Function for Solving Initial Value and Boundary Value Problems
- Lecture 11 - Adjoint Linear Differential Operator
- Lecture 12 - Adjoint Linear Differential Operator (Continued...)
- Lecture 13 - Sturm-Liouville Problems
- Lecture 14 - Laplace transformation
- Lecture 15 - Laplace transformation (Continued...)
- Lecture 16 - Laplace Transform Method for Solving Ordinary Differential Equations
- Lecture 17 - Laplace Transform Applied to Differential Equations and Convolution
- Lecture 18 - Fourier Series
- Lecture 19 - Fourier Series (Continued...)
- Lecture 20 - Gibbs Phenomenon and Parseval's Identity
- Lecture 21 - Fourier Integral and Fourier Transform
- Lecture 22 - Fourier Integral and Fourier Transform (Continued...)
- Lecture 23 - Fourier Transform Method for Solving Ordinary Differential Equations
- Lecture 24 - Frames, Riesz Bases and Orthonormal Bases
- Lecture 25 - Frames, Riesz Bases and Orthonormal Bases (Continued...)
- Lecture 26 - Fourier Series and Fourier Transform
- Lecture 27 - Time-Frequency Analysis and Gabor Transform
- Lecture 28 - Window Fourier Transform and Multiresolution Analysis
- Lecture 29 - Construction of Scaling Functions and Wavelets Using Multiresolution Analysis

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- Lecture 30 - Daubechies Wavelet
- Lecture 31 - Daubechies Wavelet (Continued...)
- Lecture 32 - Wavelet Transform and Shannon Wavelet

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

NPTEL Video Course - Mathematics - NOC:Advanced Probability Theory

Subject Co-ordinator - Prof. Niladri Chatterjee

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Advanced Probability Theory
- Lecture 2 - Advanced Probability Theory
- Lecture 3 - Advanced Probability Theory
- Lecture 4 - Advanced Probability Theory
- Lecture 5 - Advanced Probability Theory
- Lecture 6 - Advanced Probability Theory
- Lecture 7 - Advanced Probability Theory
- Lecture 8 - Advanced Probability Theory
- Lecture 9 - Advanced Probability Theory
- Lecture 10 - Advanced Probability Theory
- Lecture 11 - Advanced Probability Theory
- Lecture 12 - Advanced Probability Theory
- Lecture 13 - Advanced Probability Theory
- Lecture 14 - Advanced Probability Theory
- Lecture 15 - Advanced Probability Theory
- Lecture 16 - Advanced Probability Theory
- Lecture 17 - Advanced Probability Theory
- Lecture 18 - Advanced Probability Theory
- Lecture 19 - Advanced Probability Theory
- Lecture 20 - Advanced Probability Theory
- Lecture 21 - Advanced Probability Theory
- Lecture 22 - Advanced Probability Theory
- Lecture 23 - Advanced Probability Theory
- Lecture 24 - Advanced Probability Theory
- Lecture 25 - Advanced Probability Theory
- Lecture 26 - Advanced Probability Theory
- Lecture 27 - Advanced Probability Theory
- Lecture 28 - Advanced Probability Theory
- Lecture 29 - Advanced Probability Theory

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Lecture 30 - Advanced Probability Theory

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

NPTEL Video Course - Mathematics - NOC:Scientific Computing using Matlab

Subject Co-ordinator - Prof. Vivek Kumar Aggarwal, Prof. Mani Mehra

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction to Matlab
- Lecture 2 - Plotting of Functions in Matlab
- Lecture 3 - Symbolic Computation in Matlab
- Lecture 4 - Functions definition in Matlab
- Lecture 5 - In continuation of basics of Matlab
- Lecture 6 - In continuation of basics of Matlab (Continued...)
- Lecture 7 - Floating point representation of a number
- Lecture 8 - Errors arithmetic
- Lecture 9 - Iterative method for solving nonlinear equations
- Lecture 10 - Bisection method for solving nonlinear equations
- Lecture 11 - Order of Convergence of an Iterative Method
- Lecture 12 - Regula-Falsi and Secant Method for Solving Nonlinear Equations
- Lecture 13 - Raphson method for solving nonlinear equations
- Lecture 14 - Newton-Raphson Method for Solving Nonlinear System of Equations
- Lecture 15 - Matlab Code for Fixed Point Iteration Method
- Lecture 16 - Matlab Code for Newton-Raphson and Regula-Falsi Method
- Lecture 17 - Matlab Code for Newton Method for Solving System of Equations
- Lecture 18 - Linear System of Equations
- Lecture 19 - Linear System of Equations (Continued...)
- Lecture 20 - Gauss Elimination Method for solving Linear System of Equation
- Lecture 21 - Matlab Code for Gauss Elimination Method
- Lecture 22 - LU Decomposition Method for Solving Linear System of Equations
- Lecture 23 - LU Decomposition Method for Solving Linear System of Equations (Continued...)
- Lecture 24 - Iterative Method for Solving Linear System of Equations
- Lecture 25 - Iterative Method for Solving Linear System of Equations (Continued...)
- Lecture 26 - Matlab Code for Gauss Jacobi Method
- Lecture 27 - Matlab Code for Gauss Seidel Method
- Lecture 28 - Matlab Code for Gauss Seidel Method
- Lecture 29 - Power Method for Solving Eigenvalues of a Matrix

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- Lecture 30 - Power Method for Solving Eigenvalues of a Matrix (Continued...)
- Lecture 31 - Gershgorin Circle Theorem for Estimating Eigenvalues of a Matrix
- Lecture 32 - Gershgorin Circle Theorem for Estimating Eigenvalues of a Matrix
- Lecture 33 - Matlab Code for Power Method/ Shifted Inverse Power Method
- Lecture 34 - Interpolation
- Lecture 35 - Interpolation (Continued...)
- Lecture 36 - Interpolation (Continued...)
- Lecture 37 - Interpolating Polynomial Using Newton's Forward Difference Formula
- Lecture 38 - Error Estimates in Polynomial Approximation
- Lecture 39 - Interpolating Polynomial Using Newton's Backward Difference Formula
- Lecture 40 - Stirling's Formula and Lagrange's Interpolating Polynomial
- Lecture 41 - In Continuation of Lagrange's Interpolating Formula
- Lecture 42 - Interpolating Polynomial Using Newton's Divided Difference Formula
- Lecture 43 - Examples Based on Lagrange's and Newton's Divided Difference Interpolation
- Lecture 44 - Spline Interpolation
- Lecture 45 - Cubic Spline
- Lecture 46 - Cubic Spline (Continued...)
- Lecture 47 - Curve Fitting
- Lecture 48 - Quadratic Polynomial Fitting and Code for Lagrange's Interpolating Polynomial using Octave
- Lecture 49 - Matlab Code for Newton's Divided Difference and Least Square Approximation
- Lecture 50 - Matlab Code for Cubic Spline
- Lecture 51 - Numerical Differentiation
- Lecture 52 - Various Numerical Differentiation Formulas
- Lecture 53 - Higher Order Accurate Numerical Differentiation Formula For First Order Derivative
- Lecture 54 - Higher Order Accurate Numerical Differentiation Formula For Second Order Derivative
- Lecture 55 - Numerical Integration
- Lecture 56 - Trapezoidal Rule for Numerical Integration
- Lecture 57 - Simpson's 1/3 rule for Numerical Integration
- Lecture 58 - Simpson's 3/8 Rule for Numerical Integration
- Lecture 59 - Method of Undetermined Coefficients
- Lecture 60 - Octave Code for Trapezoidal and Simpson's Rule
- Lecture 61 - Taylor Series Method for Ordinary Differential Equations
- Lecture 62 - Linear Multistep Method (LMM) for Ordinary Differential Equations
- Lecture 63 - Convergence and Zero Stability for LMM
- Lecture 64 - Matlab/Octave Code for Initial Value Problems
- Lecture 65 - Advantage of Implicit and Explicit Methods Over Each other via Matlab/Octave Codes for Initial v

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

NPTEL Video Course - Mathematics - NOC:Non-parametric Statistical Inference

Subject Co-ordinator - Prof. Niladri Chatterjee

Co-ordinating Institute - IIT - Delhi

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

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10

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

NPTEL Video Course - Mathematics - NOC:Matrix Computation and its applications

Subject Co-ordinator - Prof. Vivek K. Aggarwal

Co-ordinating Institute - IIT - Delhi

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

Lecture 1 - Binary Operation and Groups

Lecture 2 - Vector Spaces

Lecture 3 - Some Examples of Vector Spaces

Lecture 4 - Some Examples of Vector Spaces (Continued...)

Lecture 5 - Subspace of a Vector Space

Lecture 6 - Spanning Set

Lecture 7 - Properties of Subspaces

Lecture 8 - Properties of Subspaces (Continued...)

Lecture 9 - Linearly Independent and Dependent Vectors

Lecture 10 - Linearly Independent and Dependent Vectors (Continued...)

Lecture 11 - Properties of Linearly Independent and Dependent Vectors

Lecture 12 - Properties of Linearly Independent and Dependent Vectors (Continued...)

Lecture 13 - Basis and Dimension of a Vector Space

Lecture 14 - Example of Basis and Standard Basis of a Vector Space

Lecture 15 - Linear Functions

Lecture 16 - Range Space of a Matrix and Row Reduced Echelon Form

Lecture 17 - Row Equivalent Matrices

Lecture 18 - Row Equivalent Matrices (Continued...)

Lecture 19 - Null Space of a Matrix

Lecture 20 - Four Subspaces Associated with a Given Matrix

Lecture 21 - Four Subspaces Associated with a Given Matrix (Continued...)

Lecture 22 - Linear Independence of the rows and columns of a Matrix

Lecture 23 - Application of Diagonal Dominant Matrices

Lecture 24 - Application of Zero Null Space: Interpolating Polynomial and Wronskian Matrix

Lecture 25 - Characterization of basis of a Vector Space and its Subspaces

Lecture 26 - Coordinate of a Vector with respect to Ordered Basis

Lecture 27 - Examples of different subspaces of a vector space of polynomials having degree less than or equal to

Lecture 28 - Linear Transformation

Lecture 29 - Properties of Linear Transformation

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

- Lecture 30 - Determining Linear Transformation on a Vector Space by its value on the basis element
- Lecture 31 - Range space and null space of a Linear Transformation
- Lecture 32 - Rank and Nullity of a Linear Transformation
- Lecture 33 - Rank Nullity Theorem
- Lecture 34 - Application of Rank Nullity Theorem and Inverse of a Linear Transformation
- Lecture 35 - Matrix Associated with Linear Transformation
- Lecture 36 - Matrix Representation of a Linear Transformation Relative to Ordered Bases
- Lecture 37 - Matrix Representation of a Linear Transformation Relative to Ordered Bases (Continued...)
- Lecture 38 - Linear Map Associated with a Matrix
- Lecture 39 - Similar Matrices and Diagonalisation of Matrix
- Lecture 40 - Orthonormal bases of a Vector Space
- Lecture 41 - Gram-Schmidt Orthogonalisation Process
- Lecture 42 - QR Factorisation
- Lecture 43 - Inner Product Spaces
- Lecture 44 - Inner Product of different real vector spaces and basics of complex vector space
- Lecture 45 - Inner Product on complex vector spaces and Cauchy-Schwarz inequality
- Lecture 46 - Norm of a Vector
- Lecture 47 - Matrix Norm
- Lecture 48 - Sensitivity Analysis of a System of Linear Equations
- Lecture 49 - Orthogonality of the four subspaces associated with a matrix
- Lecture 50 - Best Approximation: Least Square Method
- Lecture 51 - Best Approximation: Least Square Method (Continued...)
- Lecture 52 - Jordan-Canonical Form
- Lecture 53 - Some examples on the Jordan form of a given matrix and generalised eigen vectors
- Lecture 54 - Singular value decomposition (SVD) theorem
- Lecture 55 - Matlab/Octave code for Solving SVD
- Lecture 56 - Pseudo-Inverse/Moore-Penrose Inverse
- Lecture 57 - Householder Transformation
- Lecture 58 - Matlab/Octave code for Householder Transformation

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

NPTEL Video Course - Mathematics - Formal Languages and Automata Theory

Subject Co-ordinator - Dr. K.V. Krishna, Dr. Diganta Goswami

Co-ordinating Institute - IIT - Guwahati

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

Lecture 1 - Introduction
Lecture 2 - Alphabet, Strings, Languages
Lecture 3 - Finite Representation
Lecture 4 - Grammars (CFG)
Lecture 5 - Derivation Trees
Lecture 6 - Regular Grammars
Lecture 7 - Finite Automata
Lecture 8 - Nondeterministic Finite Automata
Lecture 9 - NFA \Leftrightarrow DFA
Lecture 10 - Myhill-Nerode Theorem
Lecture 11 - Minimization
Lecture 12 - RE \Rightarrow FA
Lecture 13 - FA \Rightarrow RE
Lecture 14 - FA \Leftrightarrow RG
Lecture 15 - Variants of FA
Lecture 16 - Closure Properties of RL
Lecture 17 - Homomorphism
Lecture 18 - Pumping Lemma
Lecture 19 - Simplification of CFG
Lecture 20 - Normal Forms of CFG
Lecture 21 - Properties of CFLs
Lecture 22 - Pushdown Automata
Lecture 23 - PDA \Leftrightarrow CFG
Lecture 24 - Turing Machines
Lecture 25 - Turing Computable Functions
Lecture 26 - Combining Turing Machines
Lecture 27 - Multi Input
Lecture 28 - Turing Decidable Languages
Lecture 29 - Variants of Turing Machines

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

- Lecture 30 - Structured Grammars
- Lecture 31 - Decidability
- Lecture 32 - Undecidability 1
- Lecture 33 - Undecidability 2
- Lecture 34 - Undecidability 3
- Lecture 35 - Time Bounded Turing Machines
- Lecture 36 - P and NP
- Lecture 37 - NP-Completeness
- Lecture 38 - NP-Complete Problems 1
- Lecture 39 - NP-Complete Problems 2
- Lecture 40 - NP-Complete Problems 3
- Lecture 41 - Chomsky Hierarchy

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

NPTEL Video Course - Mathematics - Complex Analysis

Subject Co-ordinator - Prof. P.A.S. Sree Krishna

Co-ordinating Institute - IIT - Guwahati

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

- Lecture 1 - Introduction
- Lecture 2 - Introduction to Complex Numbers
- Lecture 3 - de Moivre's Formula and Stereographic Projection
- Lecture 4 - Topology of the Complex Plane - Part-I
- Lecture 5 - Topology of the Complex Plane - Part-II
- Lecture 6 - Topology of the Complex Plane - Part-III
- Lecture 7 - Introduction to Complex Functions
- Lecture 8 - Limits and Continuity
- Lecture 9 - Differentiation
- Lecture 10 - Cauchy-Riemann Equations and Differentiability
- Lecture 11 - Analytic functions; the exponential function
- Lecture 12 - Sine, Cosine and Harmonic functions
- Lecture 13 - Branches of Multifunctions; Hyperbolic Functions
- Lecture 14 - Problem Solving Session I
- Lecture 15 - Integration and Contours
- Lecture 16 - Contour Integration
- Lecture 17 - Introduction to Cauchy's Theorem
- Lecture 18 - Cauchy's Theorem for a Rectangle
- Lecture 19 - Cauchy's theorem - Part-II
- Lecture 20 - Cauchy's Theorem - Part-III
- Lecture 21 - Cauchy's Integral Formula and its Consequences
- Lecture 22 - The First and Second Derivatives of Analytic Functions
- Lecture 23 - Morera's Theorem and Higher Order Derivatives of Analytic Functions
- Lecture 24 - Problem Solving Session II
- Lecture 25 - Introduction to Complex Power Series
- Lecture 26 - Analyticity of Power Series
- Lecture 27 - Taylor's Theorem
- Lecture 28 - Zeroes of Analytic Functions
- Lecture 29 - Counting the Zeroes of Analytic Functions

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

- Lecture 30 - Open mapping theorem - Part-I
- Lecture 31 - Open mapping theorem - Part-II
- Lecture 32 - Properties of Mobius Transformations - Part-I
- Lecture 33 - Properties of Mobius Transformations - Part-II
- Lecture 34 - Problem Solving Session III
- Lecture 35 - Removable Singularities
- Lecture 36 - Poles Classification of Isolated Singularities
- Lecture 37 - Essential Singularity & Introduction to Laurent Series
- Lecture 38 - Laurent's Theorem
- Lecture 39 - Residue Theorem and Applications
- Lecture 40 - Problem Solving Session IV

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

NPTEL Video Course - Mathematics - NOC:Mathematical Finance

Subject Co-ordinator - Prof. Siddhartha Pratim Chakrabarty

Co-ordinating Institute - IIT - Guwahati

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

- Lecture 1 - Introduction to Financial Markets and Bonds
- Lecture 2 - Introduction to Stocks, Futures and Forwards and Swaps
- Lecture 3 - Introduction to Options
- Lecture 4 - Interest Rates and Present Value
- Lecture 5 - Present and Future Values, Annuities, Amortization and Bond Yield
- Lecture 6 - Price Yield Curve and Term Structure of Interest Rates
- Lecture 7 - Markowitz Theory, Return and Risk and Two Asset Portfolio
- Lecture 8 - Minimum Variance Portfolio and Feasible Set
- Lecture 9 - Multi Asset Portfolio, Minimum Variance Portfolio, Efficient Frontier and Minimum Variance Line
- Lecture 10 - Minimum Variance Line (Continued), Market Portfolio
- Lecture 11 - Capital Market Line, Capital Asset Pricing Model
- Lecture 12 - Performance Analysis
- Lecture 13 - No-Arbitrage Principle and Pricing of Forward Contracts
- Lecture 14 - Futures, Options and Put-Call-Parity
- Lecture 15 - Bounds on Options
- Lecture 16 - Derivative Pricing in a Single Period Binomial Model
- Lecture 17 - Derivative Pricing in Multiperiod Binomial Model
- Lecture 18 - Derivative Pricing in Binomial Model and Path Dependent Options
- Lecture 19 - Discrete Probability Spaces
- Lecture 20 - Filtrations and Conditional Expectations
- Lecture 21 - Properties of Conditional Expectations
- Lecture 22 - Examples of Conditional Expectations, Martingales
- Lecture 23 - Risk-Neutral Pricing of European Derivatives in Binomial Model
- Lecture 24 - Actual and Risk-Neutral Probabilities, Markov Process, American Options
- Lecture 25 - General Probability Spaces, Expectations, Change of Measure
- Lecture 26 - Filtrations, Independence, Conditional Expectations
- Lecture 27 - Brownian Motion and its Properties
- Lecture 28 - Itô Integral and its Properties
- Lecture 29 - Itô Formula, Itô Processes

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- Lecture 30 - Multivariable Stochastic Calculus, Stochastic Differential Equations
- Lecture 31 - Black-Scholes-Merton (BSM) Model, BSM Equation, BSM Formula
- Lecture 32 - Greeks, Put-Call Parity, Change of Measure
- Lecture 33 - Girsanov Theorem, Risk-Neutral Pricing of Derivatives, BSM Formula
- Lecture 34 - MRT and Hedging, Multidimensional Girsanov and MRT
- Lecture 35 - Multidimensional BSM Model, Fundamental Theorems of Asset Pricing
- Lecture 36 - BSM Model with Dividend-Paying Stocks

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

NPTEL Video Course - Mathematics - NOC:Mathematical Portfolio Theory

Subject Co-ordinator - Prof. Siddhartha Pratim Chakrabarty

Co-ordinating Institute - IIT - Guwahati

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

Lecture 1 - Probability space and their properties, Random variables

Lecture 2 - Mean, variance, covariance and their properties

Lecture 3 - Linear regression; Binomial and normal distribution; Central Limit Theorem

Lecture 4 - Financial markets

Lecture 5 - Bonds and stocks

Lecture 6 - Binomial and geometric Brownian motion (gBm) asset pricing models

Lecture 7 - Expected return, risk and covariance of returns

Lecture 8 - Expected return and risk of a portfolio; Minimum variance portfolio

Lecture 9 - Multi-asset portfolio and Efficient frontier

Lecture 10 - Capital Market Line and Derivation of efficient frontier

Lecture 11 - Capital Asset Pricing Model and Single index model

Lecture 12 - Portfolio performance analysis

Lecture 13 - Utility functions and expected utility

Lecture 14 - Risk preferences of investors

Lecture 15 - Absolute Risk Aversion and Relative Risk Aversion

Lecture 16 - Portfolio theory with utility functions

Lecture 17 - Geometric Mean Return and Roy's Safety-First Criterion

Lecture 18 - Kataoka's Safety-First Criterion and Telser's Safety-First Criterion

Lecture 19 - Semi-variance framework

Lecture 20 - Stochastic dominance; First order stochastic dominance

Lecture 21 - Second order stochastic dominance and Third order stochastic dominance

Lecture 22 - Discrete time model and utility function

Lecture 23 - Optimal portfolio for single-period discrete time model

Lecture 24 - Optimal portfolio for multi-period discrete time model; Discrete Dynamic Programming

Lecture 25 - Continuous time model; Hamilton-Jacobi-Bellman PDE

Lecture 26 - Hamilton-Jacobi-Bellman PDE; Duality/Martingale Approach

Lecture 27 - Duality/Martingale Approach in Discrete and Continuous Time

Lecture 28 - Interest rates and bonds; Duration

Lecture 29 - Duration; Immunization

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

- Lecture 30 - Convexity; Hedging and Immunization
- Lecture 31 - Quantiles and their properties
- Lecture 32 - Value-at-Risk and its properties
- Lecture 33 - Average Value-at-Risk and its properties
- Lecture 34 - Asset allocation
- Lecture 35 - Portfolio optimization
- Lecture 36 - Portfolio optimization with constraints, Value-at-Risk

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

NPTEL Video Course - Mathematics - NOC:Discrete-time Markov Chains and Poission Processes

Subject Co-ordinator - Prof. Ayon Ganguly, Prof. Subhamay Saha

Co-ordinating Institute - IIT - Guwahati

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

- Lecture 1 - Review of Basic Probability - I
- Lecture 2 - Review of Basic Probability - II
- Lecture 3 - Review of Basic Probability - III
- Lecture 4 - Stochastic Processes
- Lecture 5 - Definition of Markov Chain and Transition Probabilities
- Lecture 6 - Markov Property and Chapman-Kolmogorov Equations
- Lecture 7 - Chapman-Kolmogorov Equations: Examples
- Lecture 8 - Accessibility and Communication of States
- Lecture 9 - Hitting Time - I
- Lecture 10 - Hitting Time - II
- Lecture 11 - Hitting Time - III
- Lecture 12 - Strong Markov Property
- Lecture 13 - Passage Time and Excursion
- Lecture 14 - Number of Visits
- Lecture 15 - Class Property
- Lecture 16 - Transience and Recurrence of Random Walks
- Lecture 17 - Stationary Distribution - I
- Lecture 18 - Stationary Distribution - II
- Lecture 19 - Stationary Distribution - III
- Lecture 20 - Limit Theorems - I
- Lecture 21 - Limit Theorems - II
- Lecture 22 - Some Problems - I
- Lecture 23 - Some Problems - II
- Lecture 24 - Time Reversibility
- Lecture 25 - Properties of Exponential Distribution
- Lecture 26 - Some Problems
- Lecture 27 - Order Statistics
- Lecture 28 - Poisson Processes
- Lecture 29 - Poisson Thinning - I

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- Lecture 30 - Poisson Thinning - II
- Lecture 31 - Conditional Arrival Times
- Lecture 32 - Independent Poisson Processes
- Lecture 33 - Some Problems
- Lecture 34 - Compound Poisson Processes

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

NPTEL Video Course - Mathematics - NOC:Introduction to Queueing Theory

Subject Co-ordinator - Prof. N. Selvaraju

Co-ordinating Institute - IIT - Guwahati

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

- Lecture 1 - Queueing Systems, System Performance Measures
- Lecture 2 - Characteristics of Queueing Systems, Kendall's Notation
- Lecture 3 - Little's Law, General Relationships
- Lecture 4 - Laplace and Laplace-Stieltjes Transforms, Probability Generating Functions
- Lecture 5 - An Overview of Stochastic Processes
- Lecture 6 - Markov Chains: Definition, Transition Probabilities
- Lecture 7 - Classification Properties of Markov Chains
- Lecture 8 - Long-Term Behaviour of Markov Chains
- Lecture 9 - Exponential Distribution and its Properties, Poisson Process
- Lecture 10 - Poisson Process and its Properties, Generalizations
- Lecture 11 - Continuous-Time Markov Chains, Generator Matrix, Kolmogorov Equations
- Lecture 12 - Stationary and Limiting Distributions of CTMC, Balance Equations, Birth-Death Processes
- Lecture 13 - Birth-Death Queues: General Theory, M/M/1 Queues and their Steady State Solution
- Lecture 14 - M/M/1 Queues: Performance Measures, PASTA Property, Waiting Time Distributions
- Lecture 15 - M/M/c Queues, Erlang Delay Formula
- Lecture 16 - M/M/c/K Queues
- Lecture 17 - Erlang's Loss System, Erlang Loss Formula, Infinite-Server Queues
- Lecture 18 - Finite-Source Queues, Engset Loss System, State-Dependent Queues, Queues with Impatience
- Lecture 19 - Transient Solutions: M/M/1/1, Infinite-Server and M/M/1 Queues, Busy Period Analysis
- Lecture 20 - Queues with Bulk Arrivals
- Lecture 21 - Queues with Bulk Service
- Lecture 22 - Erlang and Phase-Type Distributions
- Lecture 23 - Erlangian Queues: Erlangian Arrivals, Erlangian Service Times
- Lecture 24 - Nonpreemptive Priority Queues
- Lecture 25 - Nonpreemptive and Preemptive Priority Queues
- Lecture 26 - M/M/1 Retrial Queues
- Lecture 27 - Discrete-Time Queues: Geo/Geo/1 (EAS), Geo/Geo/1 (LAS)
- Lecture 28 - Introduction to Queueing Networks, Two-Node Network
- Lecture 29 - Burke's Theorem, General Setup, Tandem Networks

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- Lecture 30 - Queueing Networks with Blocking, Open Jackson Networks
- Lecture 31 - Waiting Times and Multiple Classes in Open Jackson Networks
- Lecture 32 - Closed Jackson Networks
- Lecture 33 - Closed Jackson Networks, Convolution Algorithm
- Lecture 34 - Mean-Value Analysis Algorithm
- Lecture 35 - Cyclic Queueing Networks, Extensions of Jackson Networks
- Lecture 36 - Renewal Processes
- Lecture 37 - Regenerative Processes, Semi-Markov Processes
- Lecture 38 - M/G/1 Queues, The Pollaczek-Khinchin Mean Formula
- Lecture 39 - M/G/1 Queues, The Pollaczek-Khinchin Transform Formula
- Lecture 40 - M/G/1 Queues: Waiting Times and Busy Period
- Lecture 41 - M/G/1/K Queues, Additional Insights on M/G/1 Queues
- Lecture 42 - M/G/c, M/G/∞ and M/G/c/c Queues
- Lecture 43 - G/M/1 Queues
- Lecture 44 - G/G/1 Queues: Lindley's Integral Equation
- Lecture 45 - G/G/1 Queues: Bounds
- Lecture 46 - Vacation Queues: Introduction, M/M/1 Queues with Vacations
- Lecture 47 - M/G/1 Queues with Vacations

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

NPTEL Video Course - Mathematics - Applied Multivariate Analysis

Subject Co-ordinator - Dr. Sharmishtha Mitra

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Prologue
- Lecture 2 - Basic concepts on multivariate distribution
- Lecture 3 - Basic concepts on multivariate distribution
- Lecture 4 - Multivariate normal distribution - I
- Lecture 5 - Multivariate normal distribution - II
- Lecture 6 - Multivariate normal distribution - III
- Lecture 7 - Some problems on multivariate distributions - I
- Lecture 8 - Some problems on multivariate distributions - II
- Lecture 9 - Random sampling from multivariate normal distribution and Wishart distribution - I
- Lecture 10 - Random sampling from multivariate normal distribution and Wishart distribution - II
- Lecture 11 - Random sampling from multivariate normal distribution and Wishart distribution - III
- Lecture 12 - Wishart distribution and its properties - I
- Lecture 13 - Wishart distribution and its properties - II
- Lecture 14 - Hotelling's T^2 distribution and its applications
- Lecture 15 - Hotelling's T^2 distribution and various confidence intervals and regions
- Lecture 16 - Hotelling's T^2 distribution and Profile analysis
- Lecture 17 - Profile analysis - I
- Lecture 18 - Profile analysis - II
- Lecture 19 - MANOVA - I
- Lecture 20 - MANOVA - II
- Lecture 21 - MANOVA - III
- Lecture 22 - MANOVA & Multiple Correlation Coefficient
- Lecture 23 - Multiple Correlation Coefficient
- Lecture 24 - Principal Component Analysis
- Lecture 25 - Principal Component Analysis
- Lecture 26 - Principal Component Analysis
- Lecture 27 - Cluster Analysis
- Lecture 28 - Cluster Analysis
- Lecture 29 - Cluster Analysis

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

- Lecture 30 - Cluster Analysis
- Lecture 31 - Discriminant Analysis and Classification
- Lecture 32 - Discriminant Analysis and Classification
- Lecture 33 - Discriminant Analysis and Classification
- Lecture 34 - Discriminant Analysis and Classification
- Lecture 35 - Discriminant Analysis and Classification
- Lecture 36 - Discriminant Analysis and Classification
- Lecture 37 - Discriminant Analysis and Classification
- Lecture 38 - Factor_Analysis
- Lecture 39 - Factor_Analysis
- Lecture 40 - Factor_Analysis
- Lecture 41 - Canonical Correlation Analysis
- Lecture 42 - Canonical Correlation Analysis
- Lecture 43 - Canonical Correlation Analysis
- Lecture 44 - Canonical Correlation Analysis

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

NPTEL Video Course - Mathematics - Calculus of Variations and Integral Equations

Subject Co-ordinator - Dr. Malay Banerjee, Prof. D. Bahuguna

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Calculus of Variations and Integral Equations
- Lecture 2 - Calculus of Variations and Integral Equations
- Lecture 3 - Calculus of Variations and Integral Equations
- Lecture 4 - Calculus of Variations and Integral Equations
- Lecture 5 - Calculus of Variations and Integral Equations
- Lecture 6 - Calculus of Variations and Integral Equations
- Lecture 7 - Calculus of Variations and Integral Equations
- Lecture 8 - Calculus of Variations and Integral Equations
- Lecture 9 - Calculus of Variations and Integral Equations
- Lecture 10 - Calculus of Variations and Integral Equations
- Lecture 11 - Calculus of Variations and Integral Equations
- Lecture 12 - Calculus of Variations and Integral Equations
- Lecture 13 - Calculus of Variations and Integral Equations
- Lecture 14 - Calculus of Variations and Integral Equations
- Lecture 15 - Calculus of Variations and Integral Equations
- Lecture 16 - Calculus of Variations and Integral Equations
- Lecture 17 - Calculus of Variations and Integral Equations
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- Lecture 22 - Calculus of Variations and Integral Equations
- Lecture 23 - Calculus of Variations and Integral Equations
- Lecture 24 - Calculus of Variations and Integral Equations
- Lecture 25 - Calculus of Variations and Integral Equations
- Lecture 26 - Calculus of Variations and Integral Equations
- Lecture 27 - Calculus of Variations and Integral Equations
- Lecture 28 - Calculus of Variations and Integral Equations
- Lecture 29 - Calculus of Variations and Integral Equations

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- Lecture 30 - Calculus of Variations and Integral Equations
- Lecture 31 - Calculus of Variations and Integral Equations
- Lecture 32 - Calculus of Variations and Integral Equations
- Lecture 33 - Calculus of Variations and Integral Equations
- Lecture 34 - Calculus of Variations and Integral Equations
- Lecture 35 - Calculus of Variations and Integral Equations
- Lecture 36 - Calculus of Variations and Integral Equations
- Lecture 37 - Calculus of Variations and Integral Equations
- Lecture 38 - Calculus of Variations and Integral Equations
- Lecture 39 - Calculus of Variations and Integral Equations
- Lecture 40 - Calculus of Variations and Integral Equations

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

NPTEL Video Course - Mathematics - Linear programming and Extensions

Subject Co-ordinator - Prof. Prabha Sharma

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction to Linear Programming Problems

Lecture 2 - Vector space, Linear independence and dependence, basis

Lecture 3 - Moving from one basic feasible solution to another, optimality criteria

Lecture 4 - Basic feasible solutions, existence & derivation

Lecture 5 - Convex sets, dimension of a polyhedron, Faces, Example of a polytope

Lecture 6 - Direction of a polyhedron, correspondence between bfs and extreme points

Lecture 7 - Representation theorem, LPP solution is a bfs, Assignment 1

Lecture 8 - Development of the Simplex Algorithm, Unboundedness, Simplex Tableau

Lecture 9 - Simplex Tableau & algorithm, Cycling, Bland's anti-cycling rules, Phase I & Phase II

Lecture 10 - Big-M method, Graphical solutions, adjacent extreme pts and adjacent bfs

Lecture 11 - Assignment 2, progress of Simplex algorithm on a polytope, bounded variable LPP

Lecture 12 - LPP Bounded variable, Revised Simplex algorithm, Duality theory, weak duality theorem

Lecture 13 - Weak duality theorem, economic interpretation of dual variables, Fundamental theorem of duality

Lecture 14 - Examples of writing the dual, complementary slackness theorem

Lecture 15 - Complementary slackness conditions, Dual Simplex algorithm, Assignment 3

Lecture 16 - Primal-dual algorithm

Lecture 17 - Problem in lecture 16, starting dual feasible solution, Shortest Path Problem

Lecture 18 - Shortest Path Problem, Primal-dual method, example

Lecture 19 - Shortest Path Problem-complexity, interpretation of dual variables, post-optimality analysis-changes in $\{a_{ij}\}$

Lecture 20 - Assignment 4, postoptimality analysis, changes in b , adding a new constraint, changes in $\{a_{ij}\}$

Lecture 21 - Parametric LPP-Right hand side vector

Lecture 22 - Parametric cost vector LPP

Lecture 23 - Parametric cost vector LPP, Introduction to Min-cost flow problem

Lecture 24 - Mini-cost flow problem-Transportation problem

Lecture 25 - Transportation problem degeneracy, cycling

Lecture 26 - Sensitivity analysis

Lecture 27 - Sensitivity analysis

Lecture 28 - Bounded variable transportation problem, min-cost flow problem

Lecture 29 - Min-cost flow problem

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- Lecture 30 - Starting feasible solution, Lexicographic method for preventing cycling ,strongly feasible solution
- Lecture 31 - Assignment 6, Shortest path problem, Shortest Path between any two nodes, Detection of negative cycle
- Lecture 32 - Min-cost-flow Sensitivity analysis Shortest path problem sensitivity analysis
- Lecture 33 - Min-cost flow changes in arc capacities , Max-flow problem, assignment 7
- Lecture 34 - Problem 3 (assignment 7), Min-cut Max-flow theorem, Labelling algorithm
- Lecture 35 - Max-flow - Critical capacity of an arc, starting solution for min-cost flow problem
- Lecture 36 - Improved Max-flow algorithm
- Lecture 37 - Critical Path Method (CPM)
- Lecture 38 - Programme Evaluation and Review Technique (PERT)
- Lecture 39 - Simplex Algorithm is not polynomial time- An example
- Lecture 40 - Interior Point Methods

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

NPTEL Video Course - Mathematics - Convex Optimization

Subject Co-ordinator - Dr. Joydeep Dutta

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Convex Optimization
Lecture 2 - Convex Optimization
Lecture 3 - Convex Optimization
Lecture 4 - Convex Optimization
Lecture 5 - Convex Optimization
Lecture 6 - Convex Optimization
Lecture 7 - Convex Optimization
Lecture 8 - Convex Optimization
Lecture 9 - Convex Optimization
Lecture 10 - Convex Optimization
Lecture 11 - Convex Optimization
Lecture 12 - Convex Optimization
Lecture 13 - Convex Optimization
Lecture 14 - Convex Optimization
Lecture 15 - Convex Optimization
Lecture 16 - Convex Optimization
Lecture 17 - Convex Optimization
Lecture 18 - Convex Optimization
Lecture 19 - Convex Optimization
Lecture 20 - Convex Optimization
Lecture 21 - Convex Optimization
Lecture 22 - Convex Optimization
Lecture 23 - Convex Optimization
Lecture 24 - Convex Optimization
Lecture 25 - Convex Optimization
Lecture 26 - Convex Optimization
Lecture 27 - Convex Optimization
Lecture 28 - Convex Optimization
Lecture 29 - Convex Optimization

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Lecture 30 - Convex Optimization
Lecture 31 - Convex Optimization
Lecture 32 - Convex Optimization
Lecture 33 - Convex Optimization
Lecture 34 - Convex Optimization
Lecture 35 - Convex Optimization
Lecture 36 - Convex Optimization
Lecture 37 - Convex Optimization
Lecture 38 - Convex Optimization
Lecture 39 - Convex Optimization
Lecture 40 - Convex Optimization
Lecture 41 - Convex Optimization
Lecture 42 - Convex Optimization

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

NPTEL Video Course - Mathematics - Foundations of Optimization

Subject Co-ordinator - Dr. Joydeep Dutta

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Optimization
Lecture 2 - Optimization
Lecture 3 - Optimization
Lecture 4 - Optimization
Lecture 5 - Optimization
Lecture 6 - Optimization
Lecture 7 - Optimization
Lecture 8 - Optimization
Lecture 9 - Optimization
Lecture 10 - Optimization
Lecture 11 - Optimization
Lecture 12 - Optimization
Lecture 13 - Optimization
Lecture 14 - Optimization
Lecture 15 - Optimization
Lecture 16 - Optimization
Lecture 17 - Optimization
Lecture 18 - Optimization
Lecture 19 - Optimization
Lecture 20 - Optimization
Lecture 21 - Optimization
Lecture 22 - Optimization
Lecture 23 - Optimization
Lecture 24 - Optimization
Lecture 25 - Optimization
Lecture 26 - Optimization
Lecture 27 - Optimization
Lecture 28 - Optimization
Lecture 29 - Optimization

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

Lecture 30 - Optimization
Lecture 31 - Optimization
Lecture 32 - Optimization
Lecture 33 - Optimization
Lecture 34 - Optimization
Lecture 35 - Optimization
Lecture 36 - Optimization
Lecture 37 - Optimization
Lecture 38 - Optimization

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

NPTEL Video Course - Mathematics - Probability Theory and Applications

Subject Co-ordinator - Prof. Prabha Sharma

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Basic principles of counting
- Lecture 2 - Sample space, events, axioms of probability
- Lecture 3 - Conditional probability, Independence of events
- Lecture 4 - Random variables, cumulative density function, expected value
- Lecture 5 - Discrete random variables and their distributions
- Lecture 6 - Discrete random variables and their distributions
- Lecture 7 - Discrete random variables and their distributions
- Lecture 8 - Continuous random variables and their distributions
- Lecture 9 - Continuous random variables and their distributions
- Lecture 10 - Continuous random variables and their distributions
- Lecture 11 - Function of random variables, Moment generating function
- Lecture 12 - Jointly distributed random variables, Independent r. v. and their sums
- Lecture 13 - Independent r. v. and their sums
- Lecture 14 - Chi square r. v., sums of independent normal r. v., Conditional distr
- Lecture 15 - Conditional distri, Joint distr. of functions of r. v., Order statistics
- Lecture 16 - Order statistics, Covariance and correlation
- Lecture 17 - Covariance, Correlation, Cauchy-Schwarz inequalities, Conditional expectation
- Lecture 18 - Conditional expectation, Best linear predictor
- Lecture 19 - Inequalities and bounds
- Lecture 20 - Convergence and limit theorems
- Lecture 21 - Central limit theorem
- Lecture 22 - Applications of central limit theorem
- Lecture 23 - Strong law of large numbers, Joint mgf
- Lecture 24 - Convolutions
- Lecture 25 - Stochastic processes
- Lecture 26 - Transition and state probabilities
- Lecture 27 - State prob., First passage and First return prob
- Lecture 28 - First passage and First return prob. Classification of states
- Lecture 29 - Random walk, periodic and null states

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

- Lecture 30 - Reducible Markov chains
- Lecture 31 - Time reversible Markov chains
- Lecture 32 - Poisson Processes
- Lecture 33 - Inter-arrival times, Properties of Poisson processes
- Lecture 34 - Queuing Models
- Lecture 35 - Analysis of L , L_q , W and W_q , M/M/S model
- Lecture 36 - M/M/S, M/M/I/K models
- Lecture 37 - M/M/I/K and M/M/S/K models
- Lecture 38 - Application to reliability theory failure law
- Lecture 39 - Exponential failure law, Weibull law
- Lecture 40 - Reliability of systems

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

NPTEL Video Course - Mathematics - NOC:Basic Calculus for Engineers, Scientists and Economists

Subject Co-ordinator - Dr. Joydeep Dutta

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Numbers
Lecture 2 - Functions-1
Lecture 3 - Sequence-1
Lecture 4 - Sequence-2
Lecture 5 - Limits and Continuity-1
Lecture 6 - Limits and Continuity-2
Lecture 7 - Limits And Continuity-3
Lecture 8 - Derivative-1
Lecture 9 - Derivative-2
Lecture 10 - Maxima And Minima
Lecture 11 - Mean-Value Theorem And Taylors Expansion-1
Lecture 12 - Mean-Value Theorem And Taylors Expansion-2
Lecture 13 - Integration-1
Lecture 14 - Integration-2
Lecture 15 - Integration By Parts
Lecture 16 - Definite Integral
Lecture 17 - Riemann Integration-1
Lecture 18 - Riemann Integration-2
Lecture 19 - Functions Of Two Or More Variables
Lecture 20 - Limits And Continuity Of Functions Of Two Variable
Lecture 21 - Differentiation Of Functions Of Two Variables-1
Lecture 22 - Differentiation Of Functions Of Two Variables-2
Lecture 23 - Unconstrained Minimization Of Funtions Of Two Variables
Lecture 24 - Constrained Minimization And Lagrange Multiplier Rules
Lecture 25 - Infinite Series-1
Lecture 26 - Infinite Series-2
Lecture 27 - Infinite Series-3
Lecture 28 - Multiple Integrals-1
Lecture 29 - Multiple Integrals-2

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Lecture 30 - Multiple Integrals-3

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

NPTEL Video Course - Mathematics - NOC:Probability and Stochastics for finance

Subject Co-ordinator - Dr. Joydeep Dutta

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Basic Probability

Lecture 2 - Interesting Problems In Probability

Lecture 3 - Random variables, distribution function and independence

Lecture 4 - Chebyshev inequality, Borel-Cantelli Lemmas and related issues

Lecture 5 - Law of Large Number and Central Limit Theorem

Lecture 6 - Conditional Expectation - I

Lecture 7 - Conditional Expectation - II

Lecture 8 - Martingales

Lecture 9 - Brownian Motion - I

Lecture 10 - Brownian Motion - II

Lecture 11 - Brownian Motion - III

Lecture 12 - Ito Integral - I

Lecture 13 - Ito Integral - II

Lecture 14 - Ito Calculus - I

Lecture 15 - Ito Calculus - II

Lecture 16 - Ito Integral In Higher Dimension

Lecture 17 - Application to Ito Integral - I

Lecture 18 - Application to Ito Integral - II

Lecture 19 - Black Scholes Formula - I

Lecture 20 - Black Scholes Formula - II

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

NPTEL Video Course - Mathematics - NOC:Differential Calculus in Several Variables

Subject Co-ordinator - Prof. Sudipta Dutta

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Several Variables and Notion Of distance in R^n
- Lecture 2 - Countinuity And Compactness
- Lecture 3 - Countinuity And Connectdness
- Lecture 4 - Derivatives
- Lecture 5 - Matrix Of Linear Transformation
- Lecture 6 - Examples for Differentiable function
- Lecture 7 - Sufficient condition of differentiability
- Lecture 8 - Chain Rule
- Lecture 9 - Mean Value Theorem
- Lecture 10 - Higher Order Derivatives
- Lecture 11 - Taylor's Formula
- Lecture 12 - Maximum And Minimum
- Lecture 13 - Second derivative test for maximum, minimum and saddle point
- Lecture 14 - We formalise the second derivative test discussed in Lecture 2 and do examples
- Lecture 15 - Specialisation to functions of two variables
- Lecture 16 - Implicit Function Theorem
- Lecture 17 - Implicit Function Theorem -a
- Lecture 18 - Application of IFT
- Lecture 19 - Application of IFT
- Lecture 20 - Application of IFT
- Lecture 21 - Application of IFT

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

NPTEL Video Course - Mathematics - NOC:Curves and Surfaces

Subject Co-ordinator - Prof. Sudipta Dutta

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Level curves and locus, definition of parametric curves, tangent, arc length, arc length parameter
- Lecture 2 - How much a curve is \hat{A} curved \hat{A} , signed unit normal and signed curvature, rigid motions, constant
- Lecture 3 - Curves in R^3 , principal normal and binormal, torsion
- Lecture 4 - Frenet-Serret formula
- Lecture 5 - Simple closed curve and isoperimetric inequality
- Lecture 6 - Surfaces and parametric surfaces, examples, regular surface and non-example of regular surface, t
- Lecture 7 - Transition maps of smooth surfaces, smooth function between surfaces, diffeomorphism
- Lecture 8 - Reparameterization
- Lecture 9 - Tangent, Normal
- Lecture 10 - Orientable surfaces
- Lecture 11 - Examples of Surfaces
- Lecture 12 - First Fundamental Form
- Lecture 13 - Conformal Mapping
- Lecture 14 - Curvature of Surfaces
- Lecture 15 - Euler's Theorem
- Lecture 16 - Regular Surfaces locally as Quadratic Surfaces
- Lecture 17 - Geodesics
- Lecture 18 - Existence of Geodesics, Geodesics on Surfaces of revolution
- Lecture 19 - Geodesics on surfaces of revolution; Clairaut's Theorem
- Lecture 20 - Pseudosphere
- Lecture 21 - Classification of Quadratic Surface
- Lecture 22 - Surface Area and Equiareal Map

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

NPTEL Video Course - Mathematics - NOC:Linear Regression Analysis and Forecasting

Subject Co-ordinator - Prof. Shalabh

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Basic Fundamental Concepts Of Modelling

Lecture 2 - Regression Model - A Statistical Tool

Lecture 3 - Simple Linear Regression Analysis

Lecture 4 - Estimation Of Parameters In Simple Linear Regression Model

Lecture 5 - Estimation Of Parameters In Simple Linear Regression Model (Continued...)

Lecture 6 - Estimation Of Parameters In Simple Linear Regression Model (Continued...)

Lecture 7 - Maximum Likelihood Estimation of Parameters in Simple Linear Regression Model

Lecture 8 - Testing of Hypothesis and Confidence Interval Estimation in Simple Linear Regression Model

Lecture 9 - Testing of Hypothesis and Confidence Interval Estimation in Simple Linear Regression Model (Continued...)

Lecture 10 - Software Implementation in Simple Linear Regression Model using MINITAB

Lecture 11 - Multiple Linear Regression Model

Lecture 12 - Estimation of Model Parameters in Multiple Linear Regression Model

Lecture 13 - Estimation of Model Parameters in Multiple Linear Regression Model (Continued...)

Lecture 14 - Standardized Regression Coefficients and Testing of Hypothesis

Lecture 15 - Testing of Hypothesis (Continued...) and Goodness of Fit of the Model

Lecture 16 - Diagnostics in Multiple Linear Regression Model

Lecture 17 - Diagnostics in Multiple Linear Regression Model (Continued...)

Lecture 18 - Diagnostics in Multiple Linear Regression Model (Continued...)

Lecture 19 - Software Implementation of Multiple Linear Regression Model using MINITAB

Lecture 20 - Software Implementation of Multiple Linear Regression Model using MINITAB (Continued...)

Lecture 21 - Forecasting in Multiple Linear Regression Model

Lecture 22 - Within Sample Forecasting

Lecture 23 - Outside Sample Forecasting

Lecture 24 - Software Implementation of Forecasting using MINITAB

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

NPTEL Video Course - Mathematics - NOC:Introduction to R Software

Subject Co-ordinator - Prof. Shalabh

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - How to Learn and Follow the Course

Lecture 2 - Why R and Installation Procedure

Lecture 3 - Introduction _Help_ Demo examples_ packages_ libraries

Lecture 4 - Introduction _Command line_ Data editor _ Rstudio

Lecture 5 - Basics in Calculations

Lecture 6 - Basics of Calculations _ Calculator _Built in Functions Assignments

Lecture 7 - Basics of Calculations _Functions _Matrices

Lecture 8 - Basics Calculations

Lecture 9 - Basics Calculations

Lecture 10 - Basics Calculations

Lecture 11 - Basics Calculations

Lecture 12 - Basics Calculations

Lecture 13 - Basics Calculations

Lecture 14 - Basics Calculations

Lecture 15 - Data management - Sequences

Lecture 16 - Data management - sequences

Lecture 17 - Data management - Repeats

Lecture 18 - Data management - Sorting and Ordering

Lecture 19 - Data management - Lists

Lecture 20 - Data management - Lists (Continued...)

Lecture 21 - Data management - Vector indexing

Lecture 22 - Data management - Vector Indexing (Continued...)

Lecture 23 - Data management - Factors

Lecture 24 - Data management - factors (Continued...)

Lecture 25 - Strings - Display and Formatting, Print and Format Functions

Lecture 26 - Strings - Display and Formatting, Print and Format with Concatenate

Lecture 27 - Strings - Display and Formatting, Paste Function

Lecture 28 - Strings - Display and Formatting, Splitting

Lecture 29 - Strings - Display and Formatting, Replacement_ Manipulations _Alphabets

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

- Lecture 30 - Strings - Display and Formatting, Replacement and Evaluation of Strings
- Lecture 31 - Data frames
- Lecture 32 - Data frames (Continued...)
- Lecture 33 - Data frames (Continued...)
- Lecture 34 - Data Handling - Importing CSV and Tabular Data Files
- Lecture 35 - Data Handling - Importing Data Files from Other Software
- Lecture 36 - Statistical Functions - Frequency and Partition values
- Lecture 37 - Statistical Functions - Graphics and Plots
- Lecture 38 - Statistical Functions - Central Tendency and Variation
- Lecture 39 - Statistical Functions - Boxplots, Skewness and Kurtosis
- Lecture 40 - Statistical Functions - Bivariate three dimensional plot
- Lecture 41 - Statistical Functions - Correlation and Examples of Programming
- Lecture 42 - Examples of Programming
- Lecture 43 - Examples of More Programming

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

NPTEL Video Course - Mathematics - NOC:Descriptive Statistics with R Software

Subject Co-ordinator - Prof. Shalabh

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to R Software
- Lecture 2 - Basics and R as a Calculator
- Lecture 3 - Calculations with Data Vectors
- Lecture 4 - Built-in Commands and Missing Data Handling
- Lecture 5 - Operations with Matrices
- Lecture 6 - Objectives, Steps and Basic Definitions
- Lecture 7 - Variables and Types of Data
- Lecture 8 - Absolute Frequency, Relative Frequency and Frequency Distribution
- Lecture 9 - Frequency Distribution and Cumulative Distribution Function
- Lecture 10 - Bar Diagrams
- Lecture 11 - Subdivided Bar Plots and Pie Diagrams
- Lecture 12 - 3D Pie Diagram and Histogram
- Lecture 13 - Kernel Density and Stem - Leaf Plots
- Lecture 14 - Arithmetic Mean
- Lecture 15 - Median
- Lecture 16 - Quantiles
- Lecture 17 - Mode, Geometric Mean and Harmonic Mean
- Lecture 18 - Range, Interquartile Range and Quartile Deviation
- Lecture 19 - Absolute Deviation and Absolute Mean Deviation
- Lecture 20 - Mean Squared Error, Variance and Standard Deviation
- Lecture 21 - Coefficient of Variation and Boxplots
- Lecture 22 - Raw and Central Moments
- Lecture 23 - Sheppard's Correction, Absolute Moments and Computation of Moments
- Lecture 24 - Skewness and Kurtosis
- Lecture 25 - Univariate and Bivariate Scatter Plots
- Lecture 26 - Smooth Scatter Plots
- Lecture 27 - Quantile-Quantile and Three Dimensional Plots
- Lecture 28 - Correlation Coefficient
- Lecture 29 - Correlation Coefficient Using R Software

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- Lecture 30 - Rank Correlation Coefficient
- Lecture 31 - Measures of Association for Discrete and Counting Variables - Part 1
- Lecture 32 - Measures of Association for Discrete and Counting Variables - Part 2
- Lecture 33 - Least Squares Method - One Variable
- Lecture 34 - Least Squares Method - R Commands and More than One Variables

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

NPTEL Video Course - Mathematics - NOC:Calculus of Several Real Variables

Subject Co-ordinator - Dr. Joydeep Dutta

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Vectors in plane and space
- Lecture 2 - Inner product and distance
- Lecture 3 - Application to real world problems
- Lecture 4 - Matrices and determinants
- Lecture 5 - Cross product of two vectors
- Lecture 6 - Higher dimensional Euclidean space
- Lecture 7 - Functions of more than one real-variable
- Lecture 8 - Partial derivatives and Continuity
- Lecture 9 - Vector-valued maps and Jacobian matrix
- Lecture 10 - Chain rule for partial derivatives
- Lecture 11 - The Gradient Vector and Directional Derivative
- Lecture 12 - The Implicit Function Theorem
- Lecture 13 - Higher Order Partial Derivatives
- Lecture 14 - Taylor's Theorem in Higher Dimension
- Lecture 15 - Maxima and Minima for Several Variables
- Lecture 16 - Second Derivative Test for Maximum and Minimum
- Lecture 17 - Constrained Optimization and The Lagrange Multiplier Rule
- Lecture 18 - Vector Valued Function and Classical Mechanics
- Lecture 19 - Arc Length
- Lecture 20 - Vector Fields
- Lecture 21 - Multiple Integral - I
- Lecture 22 - Multiple Integral - II
- Lecture 23 - Multiple Integral - III
- Lecture 24 - Multiple Integral - IV
- Lecture 25 - Cylindrical and Spherical Coordinates
- Lecture 26 - Multiple Integrals and Mechanics
- Lecture 27 - Line Integral - I
- Lecture 28 - Line Integral - II
- Lecture 29 - Parametrized Surfaces

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- Lecture 30 - Area of a surface Integral
- Lecture 31 - Area of parametrized surface
- Lecture 32 - Surface Integrals
- Lecture 33 - Green's Theorem
- Lecture 34 - Stoke's Theorem
- Lecture 35 - Examples of Stoke's Theorem
- Lecture 36 - Gauss Divergence Theorem
- Lecture 37 - Facts about vector fields

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

- 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 - Inner Product Space
- Lecture 40 - Inner Product (Continued...)
- Lecture 41 - Cauchy Schwartz Inequality
- Lecture 42 - Projection on a Vector
- Lecture 43 - Results on Orthogonality
- Lecture 44 - Results on Orthogonality
- Lecture 45 - Gram-Schmidt Orthonormalization Process
- Lecture 46 - Orthogonal Projections
- Lecture 47 - Gram-Schmidt Process
- Lecture 48 - Examples and Applications on QR-decomposition
- Lecture 49 - Recapitulate ideas on Inner Product Spaces
- Lecture 50 - Motivation on Eigenvalues and Eigenvectors
- Lecture 51 - Examples and Introduction to Eigenvalues and Eigenvectors
- Lecture 52 - Results on Eigenvalues and Eigenvectors
- Lecture 53 - Results on Eigenvalues and Eigenvectors (Continued...)
- 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)

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

NPTEL Video Course - Mathematics - NOC:Computational Number Theory and Algebra

Subject Co-ordinator - Prof. Nitin Saxena

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction
- Lecture 2 - Background
- Lecture 3 - GCD algorithm and Chinese Remainder Theorem
- Lecture 4 - Fast polynomial multiplication
- Lecture 5 - Fast polynomial multiplication (Continued...)
- Lecture 6 - Fast integer multiplication and division
- Lecture 7 - Fast integer arithmetic and matrix multiplication
- Lecture 8 - Matrix Multiplication Tensor
- Lecture 9 - Polynomial factoring over finite fields
- Lecture 10 - Equi-degree factorization and idea of Berlekamp's algorithm
- Lecture 11 - Berlekamp's algorithm as a reduction method
- Lecture 12 - Factoring over finite fields
- Lecture 13 - Reed Solomon Error Correcting Codes
- Lecture 14 - List Decoding
- Lecture 15 - Bivariate Factorization - Hensel Lifting
- Lecture 16 - Bivariate polynomial factoring (Continued...)
- Lecture 17 - Multivariate Polynomial Factorization
- Lecture 18 - Multivariate Factoring - Hilbert's Irreducibility Theorem
- Lecture 19 - Multivariate factoring (Continued...)
- Lecture 20 - Analysis of LLL algorithm
- Lecture 21 - Analysis of LLL algorithm (Continued...)
- Lecture 22 - Analysis of LLL-reduced basis algorithm and Introduction to NTRU cryptosystem
- Lecture 23 - NTRU cryptosystem (Continued...) and Introduction to Primality testing
- Lecture 24 - Randomized Primality testing
- Lecture 25 - Deterministic primality test (AKS) and RSA cryptosystem
- Lecture 26 - Integer factoring
- Lecture 27 - Pollard's $p-1$, Fermat, Morrison-Brillhart, Quadratic and Number field sieve methods

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NPTEL Video Course - Mathematics - NOC:Basic Calculus 1 and 2

Subject Co-ordinator - Prof. Parasar Mohanty

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Real numbers and Archimedean property
- Lecture 2 - Supremum and Decimal representation of Reals
- Lecture 3 - Functions
- Lecture 4 - Functions continued and Limits
- Lecture 5 - Limits (Continued...)
- Lecture 6 - Limits (Continued...) and Continuity
- Lecture 7 - Continuity and Intermediate Value Property
- Lecture 8 - Differentiation
- Lecture 9 - Chain Rule
- Lecture 10 - Nth derivative of a function
- Lecture 11 - Local extrema and Rolle's theorem
- Lecture 12 - Mean value theorem and Monotone functions
- Lecture 13 - Local extremum tests
- Lecture 14 - Concavity and points of inflection
- Lecture 15 - Asymptotes and plotting graph of functions
- Lecture 16 - Optimization and L'Hospital Rule
- Lecture 17 - L'Hospital Rule continued and Cauchy Mean value theorem
- Lecture 18 - Approximation of Roots
- Lecture 19 - Antiderivative and Riemann Integration
- Lecture 20 - Riemann's criterion for Integrability
- Lecture 21 - Integration and its properties
- Lecture 22 - Area and Mean value theorem for integrals
- Lecture 23 - Fundamental theorem of Calculus
- Lecture 24 - Integration by parts and Trapezoidal rule
- Lecture 25 - Simpson's rule and Substitution in integrals
- Lecture 26 - Area between curves
- Lecture 27 - Arc Length and Parametric curves
- Lecture 28 - Polar Co-ordinates
- Lecture 29 - Area of curves in polar coordinates

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- Lecture 30 - Volume of solids
- Lecture 31 - Improper Integrals
- Lecture 32 - Sequences
- Lecture 33 - Algebra of sequences and Sandwich theorem
- Lecture 34 - Subsequences
- Lecture 35 - Series
- Lecture 36 - Comparison tests for Series
- Lecture 37 - Ratio and Root test for series
- Lecture 38 - Integral test and Leibniz test for series
- Lecture 39 - Revision - I
- Lecture 40 - Revision - II

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

NPTEL Video Course - Mathematics - NOC:Advanced Partial Differential Equations

Subject Co-ordinator - Prof. Kaushik Bal

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19
Lecture 20
Lecture 21
Lecture 22
Lecture 23
Lecture 24
Lecture 25
Lecture 26
Lecture 27
Lecture 28
Lecture 29

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Lecture 30
Lecture 31
Lecture 32
Lecture 33

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

NPTEL Video Course - Mathematics - NOC:Essentials of Data Science With R Software 1: Probability and Statistics

Subject Co-ordinator - Prof. Shalabh

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Data Science - Why, What, and How?

Lecture 2 - Installation and Working with R

Lecture 3 - Installation and Working with R Studio

Lecture 4 - Calculations with R as a Calculator

Lecture 5 - Calculations with Data Vectors

Lecture 6 - Built-in Commands and Bivariate Plots

Lecture 7 - Logical Operators and Selection of Sample

Lecture 8 - Introduction to Probability

Lecture 9 - Sample Space and Events

Lecture 10 - Set Theory and Events using Venn Diagrams

Lecture 11 - Relative Frequency and Probability

Lecture 12 - Probability and Relative Frequency - An Example

Lecture 13 - Axiomatic Definition of Probability

Lecture 14 - Some Rules of Probability

Lecture 15 - Basic Principles of Counting - Ordered Set, Unordered Set, and Permutations

Lecture 16 - Basic Principles of Counting - Combination

Lecture 17 - Conditional Probability

Lecture 18 - Multiplication Theorem of Probability

Lecture 19 - Bayes' Theorem

Lecture 20 - Independent Events

Lecture 21 - Computation of Probability using R

Lecture 22 - Random Variables - Discrete and Continuous

Lecture 23 - Cumulative Distribution and Probability Density Function

Lecture 24 - Discrete Random Variables, Probability Mass Function and Cumulative Distribution Function

Lecture 25 - Expectation of Variables

Lecture 26 - Moments and Variance

Lecture 27 - Data Based Moments and Variance in R Software

Lecture 28 - Skewness and Kurtosis

Lecture 29 - Quantiles and Tschebyschev's Inequality

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

- Lecture 30 - Degenerate and Discrete Uniform Distributions
- Lecture 31 - Discrete Uniform Distribution in R
- Lecture 32 - Bernoulli and Binomial Distribution
- Lecture 33 - Binomial Distribution in R
- Lecture 34 - Poisson Distribution
- Lecture 35 - Poisson Distribution in R
- Lecture 36 - Geometric Distribution
- Lecture 37 - Geometric Distribution in R
- Lecture 38 - Continuous Random Variables and Uniform Distribution
- Lecture 39 - Normal Distribution
- Lecture 40 - Normal Distribution in R
- Lecture 41 - Normal Distribution - More Results
- Lecture 42 - Exponential Distribution
- Lecture 43 - Bivariate Probability Distribution for Discrete Random Variables
- Lecture 44 - Bivariate Probability Distribution in R Software
- Lecture 45 - Bivariate Probability Distribution for Continuous Random Variables
- Lecture 46 - Examples in Bivariate Probability Distribution Functions
- Lecture 47 - Covariance and Correlation
- Lecture 48 - Covariance and Correlation $\hat{\rho}$ • Examples and R Software
- Lecture 49 - Bivariate Normal Distribution
- Lecture 50 - Chi square Distribution
- Lecture 51 - t-Distribution
- Lecture 52 - F-Distribution
- Lecture 53 - Distribution of Sample Mean, Convergence in Probability and Weak Law of Large Numbers
- Lecture 54 - Central Limit Theorem
- Lecture 55 - Needs for Drawing Statistical Inferences
- Lecture 56 - Unbiased Estimators
- Lecture 57 - Efficiency of Estimators
- Lecture 58 - Cram r Rao Lower Bound and Efficiency of Estimators
- Lecture 59 - Consistency and Sufficiency of Estimators
- Lecture 60 - Method of Moments
- Lecture 61 - Method of Maximum Likelihood and Rao Blackwell Theorem
- Lecture 62 - Basic Concepts of Confidence Interval Estimation
- Lecture 63 - Confidence Interval for Mean in One Sample with Known Variance
- Lecture 64 - Confidence Interval for Mean and Variance
- Lecture 65 - Basics of Tests of Hypothesis and Decision Rules
- Lecture 66 - Test Procedures for One Sample Test for Mean with Known Variance
- Lecture 67 - One Sample Test for Mean with Unknown Variance
- Lecture 68 - Two Sample Test for Mean with Known and Unknown Variances

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

Lecture 69 - Test of Hypothesis for Variance in One and Two Samples

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

NPTEL Video Course - Mathematics - NOC:Essentials of Data Science With R Software 2: Sampling Theory and Line

Subject Co-ordinator - Prof. Shalabh

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - What is Data Science ?

Lecture 2 - Installation and Working with R

Lecture 3 - Calculations with R as a Calculator

Lecture 4 - Calculations with Data Vectors

Lecture 5 - Built-in Commands and Missing Data Handling

Lecture 6 - Operations with Matrices

Lecture 7 - Data Handling

Lecture 8 - Graphics and Plots

Lecture 9 - Sampling, Sampling Unit, Population and Sample

Lecture 10 - Terminologies and Concepts

Lecture 11 - Ensuring Representativeness and Type of Surveys

Lecture 12 - Conducting Surveys and Ensuring Representativeness

Lecture 13 - SRSWOR, SRSWR, and Selection of Unit - 1

Lecture 14 - SRSWOR, SRSWR, and Selection of Unit - 2

Lecture 15 - Probabilities of Selection of Samples

Lecture 16 - SRSWOR and SRSWR with R with sample Package

Lecture 17 - Examples of SRS with R using sample Package

Lecture 18 - Simple Random Sampling : SRS with R using sampling and sample Packages

Lecture 19 - Simple Random Sampling : Estimation of Population Mean

Lecture 20 - Simple Random Sampling : Estimation of Population Variance

Lecture 21 - Simple Random Sampling : Estimation of Population Variance

Lecture 22 - SRS: Confidence Interval Estimation of Population Mean

Lecture 23 - SRS: Estimation of Mean, Variance and Confidence Interval in SRSWOR using R

Lecture 24 - SRS: Estimation of Mean, Variance and Confidence Interval in SRSWR using R

Lecture 25 - Sampling for Proportions and Percentages : Basic Concepts

Lecture 26 - Sampling for Proportions and Percentages : Mean and Variance of Sample Proportion

Lecture 27 - Sampling for Proportions and Percentages : Sampling for Proportions with R

Lecture 28 - Stratified Random Sampling : Drawing the Sample and Sampling Procedure

Lecture 29 - Stratified Random Sampling : Estimation of Population Mean, Population Variance and Confidence Interval

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

- Lecture 30 - Stratified Random Sampling : Sample Allocation and Variances Under Allocation
- Lecture 31 - Stratified Random Sampling : Drawing of Sample Using sampling and strata Packages in R
- Lecture 32 - Stratified Random Sampling : Drawing of Sample Using survey Package in R
- Lecture 33 - Bootstrap Methodology : What is Bootstrap and Methodology
- Lecture 34 - Bootstrap Methodology : EDF, Bootstrap Bias and Bootstrap Standard Errors
- Lecture 35 - Bootstrap Methodology : Bootstrap Analysis Using boot Package in R
- Lecture 36 - Bootstrap Methodology : Bootstrap Confidence Interval
- Lecture 37 - Bootstrap Methodology : Bootstrap Confidence Interval Using boot and bootstrap Packages in R
- Lecture 38 - Bootstrap Methodology : Example of Bootstrap Analysis Using boot Package
- Lecture 39 - Introduction to Linear Models and Regression : Introduction and Basic Concepts
- Lecture 40 - Simple Linear Regression Analysis : Basic Concepts and Least Squares Estimation
- Lecture 41 - Simple Linear Regression Analysis : Fitting Linear Model With R Software
- Lecture 42 - Simple Linear Regression Analysis : Properties of Least Squares Estimators
- Lecture 43 - Simple Linear Regression Analysis : Maximum Likelihood and Confidence Interval Estimation
- Lecture 44 - Simple Linear Regression Analysis : Test of Hypothesis and Confidence Interval Estimation With R
- Lecture 45 - Multiple Linear Regression Analysis : Basic Concepts
- Lecture 46 - Multiple Linear Regression Analysis : OLSE, Fitted Model and Residuals
- Lecture 47 - Multiple Linear Regression Analysis : Model Fitting With R Software
- Lecture 48 - Multiple Linear Regression Analysis : Properties of OLSE and Maximum Likelihood Estimation
- Lecture 49 - Multiple Linear Regression Analysis : Test of Hypothesis and Confidence Interval Estimation on I
- Lecture 50 - Analysis of Variance and Implementation in R Software
- Lecture 51 - Goodness of Fit and Implementation in R Software
- Lecture 52 - Variable Selection using LASSO Regression : Introduction and Basic Concepts
- Lecture 53 - Variable Selection using LASSO Regression : LASSO with R

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

NPTEL Video Course - Mathematics - NOC:Measure Theoretic Probability 1

Subject Co-ordinator - Prof. Suprio Bhar

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction to the course Measure Theoretic Probability 1

Lecture 2 - Sigma-fields and Measurable spaces

Lecture 3 - Fields and Generating sets for Sigma-fields

Lecture 4 - Borel Sigma-field on \mathbb{R} and other sets

Lecture 5 - Limits of sequences of sets and Monotone classes

Lecture 6 - Measures and Measure spaces

Lecture 7 - Probability Measures

Lecture 8 - Properties of Measures - I

Lecture 9 - Properties of Measures - II

Lecture 10 - Properties of Measures - III

Lecture 11 - Measurable functions

Lecture 12 - Borel Measurable functions

Lecture 13 - Algebraic properties of Measurable functions

Lecture 14 - Limiting behaviour of measurable functions

Lecture 15 - Random Variables and Random Vectors

Lecture 16 - Law or Distribution of an RV

Lecture 17 - Distribution Function of an RV

Lecture 18 - Decomposition of Distribution functions

Lecture 19 - Construction of RVs with a specified law

Lecture 20 - Caratheodery Extension Theorem

Lecture 21 - From Distribution Functions to Probability Measures - I

Lecture 22 - From Distribution Functions to Probability Measures - II

Lecture 23 - Lebesgue-Stieltjes Measures

Lecture 24 - Properties of Lebesgue Measure on \mathbb{R}

Lecture 25 - Distribution Functions and Probability Measures in higher dimensions

Lecture 26 - Integration of measurable functions

Lecture 27 - Properties of Measure Theoretic Integration - I

Lecture 28 - Properties of Measure Theoretic Integration - II

Lecture 29 - Monotone Convergence Theorem

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

- Lecture 30 - Computation of Expectation for Discrete RVs
- Lecture 31 - MCT and the Linearity of Measure Theoretic Integration
- Lecture 32 - Sets of measure zero and Measure Theoretic Integration
- Lecture 33 - Fatou's Lemma and Dominated Convergence Theorem
- Lecture 34 - Riemann and Lebesgue integration
- Lecture 35 - Computations involving Lebesgue Integration
- Lecture 36 - Decomposition of Measures
- Lecture 37 - Absolutely Continuous RVs
- Lecture 38 - Expectation of Absolutely Continuous RVs
- Lecture 39 - Inequalities involving moments of RVs
- Lecture 40 - Conclusion to the course Measure Theoretic Probability 1

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

NPTEL Video Course - Mathematics - Advanced Engineering Mathematics

Subject Co-ordinator - Dr. P. Panigrahi, Prof. J. Kumar, Prof. P.D. Srivastava, Prof. Somesh Kumar

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Review Groups, Fields and Matrices
- Lecture 2 - Vector Spaces, Subspaces, Linearly Dependent/Independent of Vectors
- Lecture 3 - Basis, Dimension, Rank and Matrix Inverse
- Lecture 4 - Linear Transformation, Isomorphism and Matrix Representation
- Lecture 5 - System of Linear Equations, Eigenvalues and Eigenvectors
- Lecture 6 - Method to Find Eigenvalues and Eigenvectors, Diagonalization of Matrices
- Lecture 7 - Jordan Canonical Form, Cayley Hamilton Theorem
- Lecture 8 - Inner Product Spaces, Cauchy-Schwarz Inequality
- Lecture 9 - Orthogonality, Gram-Schmidt Orthogonalization Process
- Lecture 10 - Spectrum of special matrices, positive/negative definite matrices
- Lecture 11 - Concept of Domain, Limit, Continuity and Differentiability
- Lecture 12 - Analytic Functions, C-R Equations
- Lecture 13 - Harmonic Functions
- Lecture 14 - Line Integral in the Complex
- Lecture 15 - Cauchy Integral Theorem
- Lecture 16 - Cauchy Integral Theorem (Continued.)
- Lecture 17 - Cauchy Integral Formula
- Lecture 18 - Power and Taylor's Series of Complex Numbers
- Lecture 19 - Power and Taylor's Series of Complex Numbers (Continued.)
- Lecture 20 - Taylor's, Laurent Series of $f(z)$ and Singularities
- Lecture 21 - Classification of Singularities, Residue and Residue Theorem
- Lecture 22 - Laplace Transform and its Existence
- Lecture 23 - Properties of Laplace Transform
- Lecture 24 - Evaluation of Laplace and Inverse Laplace Transform
- Lecture 25 - Applications of Laplace Transform to Integral Equations and ODEs
- Lecture 26 - Applications of Laplace Transform to PDEs
- Lecture 27 - Fourier Series
- Lecture 28 - Fourier Series (Continued.)
- Lecture 29 - Fourier Integral Representation of a Function

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- Lecture 30 - Introduction to Fourier Transform
- Lecture 31 - Applications of Fourier Transform to PDEs
- Lecture 32 - Laws of Probability - I
- Lecture 33 - Laws of Probability - II
- Lecture 34 - Problems in Probability
- Lecture 35 - Random Variables
- Lecture 36 - Special Discrete Distributions
- Lecture 37 - Special Continuous Distributions
- Lecture 38 - Joint Distributions and Sampling Distributions
- Lecture 39 - Point Estimation
- Lecture 40 - Interval Estimation
- Lecture 41 - Basic Concepts of Testing of Hypothesis
- Lecture 42 - Tests for Normal Populations

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

NPTEL Video Course - Mathematics - Functional Analysis

Subject Co-ordinator - Prof. P.D. Srivastava

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Metric Spaces with Examples
- Lecture 2 - Holder Inequality and Minkowski Inequality
- Lecture 3 - Various Concepts in a Metric Space
- Lecture 4 - Separable Metrics Spaces with Examples
- Lecture 5 - Convergence, Cauchy Sequence, Completeness
- Lecture 6 - Examples of Complete and Incomplete Metric Spaces
- Lecture 7 - Completion of Metric Spaces + Tutorial
- Lecture 8 - Vector Spaces with Examples
- Lecture 9 - Normed Spaces with Examples
- Lecture 10 - Banach Spaces and Schauder Basis
- Lecture 11 - Finite Dimensional Normed Spaces and Subspaces
- Lecture 12 - Compactness of Metric/Normed Spaces
- Lecture 13 - Linear Operators-definition and Examples
- Lecture 14 - Bounded Linear Operators in a Normed Space
- Lecture 15 - Bounded Linear Functionals in a Normed Space
- Lecture 16 - Concept of Algebraic Dual and Reflexive Space
- Lecture 17 - Dual Basis & Algebraic Reflexive Space
- Lecture 18 - Dual Spaces with Examples
- Lecture 19 - Tutorial - I
- Lecture 20 - Tutorial - II
- Lecture 21 - Inner Product & Hilbert Space
- Lecture 22 - Further Properties of Inner Product Spaces
- Lecture 23 - Projection Theorem, Orthonormal Sets and Sequences
- Lecture 24 - Representation of Functionals on a Hilbert Spaces
- Lecture 25 - Hilbert Adjoint Operator
- Lecture 26 - Self Adjoint, Unitary & Normal Operators
- Lecture 27 - Tutorial - III
- Lecture 28 - Annihilator in an IPS
- Lecture 29 - Total Orthonormal Sets And Sequences

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

- Lecture 30 - Partially Ordered Set and Zorns Lemma
- Lecture 31 - Hahn Banach Theorem for Real Vector Spaces
- Lecture 32 - Hahn Banach Theorem for Complex V.S. & Normed Spaces
- Lecture 33 - Baires Category & Uniform Boundedness Theorems
- Lecture 34 - Open Mapping Theorem
- Lecture 35 - Closed Graph Theorem
- Lecture 36 - Adjoint Operator
- Lecture 37 - Strong and Weak Convergence
- Lecture 38 - Convergence of Sequence of Operators and Functionals
- Lecture 39 - LP - Space
- Lecture 40 - LP - Space (Continued.)

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

NPTEL Video Course - Mathematics - Numerical methods of Ordinary and Partial Differential Equations

Subject Co-ordinator - Dr. G.P. Raja Sekhar

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Motivation with few Examples
- Lecture 2 - Single - Step Methods for IVPs
- Lecture 3 - Analysis of Single Step Methods
- Lecture 4 - Runge - Kutta Methods for IVPs
- Lecture 5 - Higher Order Methods/Equations
- Lecture 6 - Error - Stability - Convergence of Single Step Methods
- Lecture 7 - Tutorial - I
- Lecture 8 - Tutorial - II
- Lecture 9 - Multi-Step Methods (Explicit)
- Lecture 10 - Multi-Step Methods (Implicit)
- Lecture 11 - Convergence and Stability of multi step methods
- Lecture 12 - General methods for absolute stability
- Lecture 13 - Stability Analysis of Multi Step Methods
- Lecture 14 - Predictor - Corrector Methods
- Lecture 15 - Some Comments on Multi - Step Methods
- Lecture 16 - Finite Difference Methods - Linear BVPs
- Lecture 17 - Linear/Non - Linear Second Order BVPs
- Lecture 18 - BVPS - Derivative Boundary Conditions
- Lecture 19 - Higher Order BVPs
- Lecture 20 - Shooting Method BVPs
- Lecture 21 - Tutorial - III
- Lecture 22 - Introduction to First Order PDE
- Lecture 23 - Introduction to Second Order PDE
- Lecture 24 - Finite Difference Approximations to Parabolic PDEs
- Lecture 25 - Implicit Methods for Parabolic PDEs
- Lecture 26 - Consistency, Stability and Convergence
- Lecture 27 - Other Numerical Methods for Parabolic PDEs
- Lecture 28 - Tutorial - IV
- Lecture 29 - Matrix Stability Analysis of Finite Difference Scheme

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- Lecture 30 - Fourier Series Stability Analysis of Finite Difference Scheme
- Lecture 31 - Finite Difference Approximations to Elliptic PDEs - I
- Lecture 32 - Finite Difference Approximations to Elliptic PDEs - II
- Lecture 33 - Finite Difference Approximations to Elliptic PDEs - III
- Lecture 34 - Finite Difference Approximations to Elliptic PDEs - IV
- Lecture 35 - Finite Difference Approximations to Hyperbolic PDEs - I
- Lecture 36 - Finite Difference Approximations to Hyperbolic PDEs - II
- Lecture 37 - Method of characteristics for Hyperbolic PDEs - I
- Lecture 38 - Method of characteristics for Hyperbolic PDEs - II
- Lecture 39 - Finite Difference Approximations to 1st order Hyperbolic PDEs
- Lecture 40 - Summary, Appendices, Remarks

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

NPTEL Video Course - Mathematics - Optimization

Subject Co-ordinator - Prof. A. Goswami, Dr. Debjani Chakraborty

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Optimization - Introduction
Lecture 2 - Formulation of LPP
Lecture 3 - Geometry of LPP and Graphical Solution of LPP
Lecture 4 - Solution of LPP
Lecture 5 - Big - M Method
Lecture 6 - Two - Phase Method
Lecture 7 - Special Cases in Simple Applications
Lecture 8 - Introduction to Duality Theory
Lecture 9 - Dual Simplex Method
Lecture 10 - Post Optimality Analysis
Lecture 11 - Integer Programming - I
Lecture 12 - Integer Programming - II
Lecture 13 - Introduction to Transportation Problems
Lecture 14 - Solving Various types of Transportation Problems
Lecture 15 - Assignment Problems
Lecture 16 - Project Management
Lecture 17 - Critical Path Analysis
Lecture 18 - PERT
Lecture 19 - Shortest Path Algorithm
Lecture 20 - Travelling Salesman Problem
Lecture 21 - Classical optimization techniques
Lecture 22 - Unconstrained multivariable optimization
Lecture 23 - Nonlinear programming with equality constraint
Lecture 24 - Nonlinear programming KKT conditions
Lecture 25 - Numerical optimization
Lecture 26 - Numerical optimization
Lecture 27 - Fibonacci Method
Lecture 28 - Golden Section Methods
Lecture 29 - Interpolation Methods

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- Lecture 30 - Unconstrained optimization techniques
- Lecture 31 - Unconstrained optimization techniques
- Lecture 32 - Nonlinear programming
- Lecture 33 - Interior and Exterior penalty Function Method
- Lecture 34 - Separable Programming Problem
- Lecture 35 - Introduction to Geometric Programming
- Lecture 36 - Constrained Geometric Programming Problem
- Lecture 37 - Dynamic Programming Problem
- Lecture 38 - Dynamic Programming Problem (Continued.)
- Lecture 39 - Multi Objective Decision Making
- Lecture 40 - Multi attribute decision making

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

NPTEL Video Course - Mathematics - Probability and Statistics

Subject Co-ordinator - Prof. Somesh Kumar

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Algebra of Sets - I
Lecture 2 - Algebra of Sets - II
Lecture 3 - Introduction to Probability
Lecture 4 - Laws of Probability - I
Lecture 5 - Laws of Probability - II
Lecture 6 - Problems in Probability
Lecture 7 - Random Variables
Lecture 8 - Probability Distributions
Lecture 9 - Characteristics of Distribution
Lecture 10 - Special Distributions - I
Lecture 11 - Special Distributions - II
Lecture 12 - Special Distributions - III
Lecture 13 - Special Distributions - IV
Lecture 14 - Special Distributions - V
Lecture 15 - Special Distributions - VI
Lecture 16 - Special Distributions - VII
Lecture 17 - Functions of a Random Variable
Lecture 18 - Joint Distributions - I
Lecture 19 - Joint Distributions - II
Lecture 20 - Joint Distributions - III
Lecture 21 - Joint Distributions - IV
Lecture 22 - Transformations of Random Vectors
Lecture 23 - Sampling Distributions - I
Lecture 24 - Sampling Distributions - II
Lecture 25 - Descriptive Statistics - I
Lecture 26 - Descriptive Statistics - II
Lecture 27 - Estimation - I
Lecture 28 - Estimation - II
Lecture 29 - Estimation - III

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- Lecture 30 - Estimation - IV
- Lecture 31 - Estimation - V
- Lecture 32 - Estimation - VI
- Lecture 33 - Testing of Hypothesis - I
- Lecture 34 - Testing of Hypothesis - II
- Lecture 35 - Testing of Hypothesis - III
- Lecture 36 - Testing of Hypothesis - IV
- Lecture 37 - Testing of Hypothesis - V
- Lecture 38 - Testing of Hypothesis - VI
- Lecture 39 - Testing of Hypothesis - VII
- Lecture 40 - Testing of Hypothesis - VIII

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NPTEL Video Course - Mathematics - Regression Analysis

Subject Co-ordinator - Dr. Soumen Maity

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Simple Linear Regression
- Lecture 2 - Simple Linear Regression (Continued...1)
- Lecture 3 - Simple Linear Regression (Continued...2)
- Lecture 4 - Simple Linear Regression (Continued...3)
- Lecture 5 - Simple Linear Regression (Continued...4)
- Lecture 6 - Multiple Linear Regression
- Lecture 7 - Multiple Linear Regression (Continued...1)
- Lecture 8 - Multiple Linear Regression (Continued...2)
- Lecture 9 - Multiple Linear Regression (Continued...3)
- Lecture 10 - Selecting the BEST Regression model
- Lecture 11 - Selecting the BEST Regression model (Continued...1)
- Lecture 12 - Selecting the BEST Regression model (Continued...2)
- Lecture 13 - Selecting the BEST Regression model (Continued...3)
- Lecture 14 - Multicollinearity
- Lecture 15 - Multicollinearity (Continued...1)
- Lecture 16 - Multicollinearity (Continued...2)
- Lecture 17 - Model Adequacy Checking
- Lecture 18 - Model Adequacy Checking (Continued...1)
- Lecture 19 - Model Adequacy Checking (Continued...2)
- Lecture 20 - Test for Influential Observations
- Lecture 21 - Transformations and Weighting to correct model inadequacies
- Lecture 22 - Transformations and Weighting to correct model inadequacies (Continued...1)
- Lecture 23 - Transformations and Weighting to correct model inadequacies (Continued...2)
- Lecture 24 - Dummy Variables
- Lecture 25 - Dummy Variables (Continued...1)
- Lecture 26 - Dummy Variables (Continued...2)
- Lecture 27 - Polynomial Regression Models
- Lecture 28 - Polynomial Regression Models (Continued...1)
- Lecture 29 - Polynomial Regression Models (Continued...2)

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- Lecture 30 - Generalized Linear Models
- Lecture 31 - Generalized Linear Models (Continued.)
- Lecture 32 - Non-Linear Estimation
- Lecture 33 - Regression Models with Autocorrelated Errors
- Lecture 34 - Regression Models with Autocorrelated Errors (Continued.)
- Lecture 35 - Measurement Errors & Calibration Problem
- Lecture 36 - Tutorial - I
- Lecture 37 - Tutorial - II
- Lecture 38 - Tutorial - III
- Lecture 39 - Tutorial - IV
- Lecture 40 - Tutorial - V

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

NPTEL Video Course - Mathematics - Statistical Inference

Subject Co-ordinator - Prof. Somesh Kumar

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction and Motivation
Lecture 2 - Basic Concepts of Point Estimations - I
Lecture 3 - Basic Concepts of Point Estimations - II
Lecture 4 - Finding Estimators - I
Lecture 5 - Finding Estimators - II
Lecture 6 - Finding Estimators - III
Lecture 7 - Properties of MLEs
Lecture 8 - Lower Bounds for Variance - I
Lecture 9 - Lower Bounds for Variance - II
Lecture 10 - Lower Bounds for Variance - III
Lecture 11 - Lower Bounds for Variance - IV
Lecture 12 - Sufficiency
Lecture 13 - Sufficiency and Information
Lecture 14 - Minimal Sufficiency, Completeness
Lecture 15 - UMVU Estimation, Ancillarity
Lecture 16 - Invariance - I
Lecture 17 - Invariance - II
Lecture 18 - Bayes and Minimax Estimation - I
Lecture 19 - Bayes and Minimax Estimation - II
Lecture 20 - Bayes and Minimax Estimation - III
Lecture 21 - Testing of Hypotheses
Lecture 22 - Neyman Pearson Fundamental Lemma
Lecture 23 - Applications of NP lemma
Lecture 24 - UMP Tests
Lecture 25 - UMP Tests (Continued.)
Lecture 26 - UMP Unbiased Tests
Lecture 27 - UMP Unbiased Tests (Continued.)
Lecture 28 - UMP Unbiased Tests
Lecture 29 - Unbiased Tests for Normal Populations

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

- Lecture 30 - Unbiased Tests for Normal Populations (Continued.)
- Lecture 31 - Likelihood Ratio Tests - I
- Lecture 32 - Likelihood Ratio Tests - II
- Lecture 33 - Likelihood Ratio Tests - III
- Lecture 34 - Likelihood Ratio Tests - IV
- Lecture 35 - Invariant Tests
- Lecture 36 - Test for Goodness of Fit
- Lecture 37 - Sequential Procedure
- Lecture 38 - Sequential Procedure (Continued.)
- Lecture 39 - Confidence Intervals
- Lecture 40 - Confidence Intervals (Continued.)

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

NPTEL Video Course - Mathematics - A Basic Course in Real Analysis

Subject Co-ordinator - Prof. P.D. Srivastava

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Rational Numbers and Rational Cuts

Lecture 2 - Irrational numbers, Dedekind's Theorem

Lecture 3 - Continuum and Exercises

Lecture 4 - Continuum and Exercises (Continued.)

Lecture 5 - Cantor's Theory of Irrational Numbers

Lecture 6 - Cantor's Theory of Irrational Numbers (Continued.)

Lecture 7 - Equivalence of Dedekind and Cantor's Theory

Lecture 8 - Finite, Infinite, Countable and Uncountable Sets of Real Numbers

Lecture 9 - Types of Sets with Examples, Metric Space

Lecture 10 - Various properties of open set, closure of a set

Lecture 11 - Ordered set, Least upper bound, greatest lower bound of a set

Lecture 12 - Compact Sets and its properties

Lecture 13 - Weiersstrass Theorem, Heine Borel Theorem, Connected set

Lecture 14 - Tutorial - II

Lecture 15 - Concept of limit of a sequence

Lecture 16 - Some Important limits, Ratio tests for sequences of Real Numbers

Lecture 17 - Cauchy theorems on limit of sequences with examples

Lecture 18 - Fundamental theorems on limits, Bolzano-Weiersstrass Theorem

Lecture 19 - Theorems on Convergent and divergent sequences

Lecture 20 - Cauchy sequence and its properties

Lecture 21 - Infinite series of real numbers

Lecture 22 - Comparison tests for series, Absolutely convergent and Conditional convergent series

Lecture 23 - Tests for absolutely convergent series

Lecture 24 - Raabe's test, limit of functions, Cluster point

Lecture 25 - Some results on limit of functions

Lecture 26 - Limit Theorems for functions

Lecture 27 - Extension of limit concept (one sided limits)

Lecture 28 - Continuity of Functions

Lecture 29 - Properties of Continuous Functions

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

- Lecture 30 - Boundedness Theorem, Max-Min Theorem and Bolzano's theorem
- Lecture 31 - Uniform Continuity and Absolute Continuity
- Lecture 32 - Types of Discontinuities, Continuity and Compactness
- Lecture 33 - Continuity and Compactness (Continued.), Connectedness
- Lecture 34 - Differentiability of real valued function, Mean Value Theorem
- Lecture 35 - Mean Value Theorem (Continued.)
- Lecture 36 - Application of MVT , Darboux Theorem, L Hospital Rule
- Lecture 37 - L'Hospital Rule and Taylor's Theorem
- Lecture 38 - Tutorial - III
- Lecture 39 - Riemann/Riemann Stieltjes Integral
- Lecture 40 - Existence of Reimann Stieltjes Integral
- Lecture 41 - Properties of Reimann Stieltjes Integral
- Lecture 42 - Properties of Reimann Stieltjes Integral (Continued.)
- Lecture 43 - Definite and Indefinite Integral
- Lecture 44 - Fundamental Theorems of Integral Calculus
- Lecture 45 - Improper Integrals
- Lecture 46 - Convergence Test for Improper Integrals

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

NPTEL Video Course - Mathematics - Statistical Methods for Scientists and Engineers

Subject Co-ordinator - Prof. Somesh Kumar

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Foundations of Probability
- Lecture 2 - Laws of Probability
- Lecture 3 - Random Variables
- Lecture 4 - Moments and Special Distributions
- Lecture 5 - Moments and Special Distributions (Continued...)
- Lecture 6 - Special Distributions (Continued...)
- Lecture 7 - Special Distributions (Continued...)
- Lecture 8 - Sampling Distributions
- Lecture 9 - Parametric Methods - I
- Lecture 10 - Parametric Methods - II
- Lecture 11 - Parametric Methods - III
- Lecture 12 - Parametric Methods - IV
- Lecture 13 - Parametric Methods - V
- Lecture 14 - Parametric Methods - VI
- Lecture 15 - Parametric Methods - VII
- Lecture 16 - Multivariate Analysis - I
- Lecture 17 - Multivariate Analysis - II
- Lecture 18 - Multivariate Analysis - III
- Lecture 19 - Multivariate Analysis - IV
- Lecture 20 - Multivariate Analysis - V
- Lecture 21 - Multivariate Analysis - VI
- Lecture 22 - Multivariate Analysis - VII
- Lecture 23 - Multivariate Analysis - VIII
- Lecture 24 - Multivariate Analysis - IX
- Lecture 25 - Multivariate Analysis - X
- Lecture 26 - Multivariate Analysis - XI
- Lecture 27 - Multivariate Analysis - XII
- Lecture 28 - Non parametric Methods - I
- Lecture 29 - Non parametric Methods - II

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

- Lecture 30 - Non parametric Methods - III
- Lecture 31 - Non parametric Methods - IV
- Lecture 32 - Nonparametric Methods - V
- Lecture 33 - Nonparametric Methods - VI
- Lecture 34 - Nonparametric Methods - VII
- Lecture 35 - Nonparametric Methods - VIII
- Lecture 36 - Nonparametric Methods - IX
- Lecture 37 - Nonparametric Methods - X
- Lecture 38 - Nonparametric Methods - XI
- Lecture 39 - Nonparametric Methods - XII
- Lecture 40 - Nonparametric Methods - XIII

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

NPTEL Video Course - Mathematics - NOC:Probability and Statistics

Subject Co-ordinator - Prof. Somesh Kumar

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Sets, Classes, Collection
Lecture 2 - Sequence of Sets
Lecture 3 - Ring, Field (Algebra)
Lecture 4 - Sigma-Ring, Sigma-Field, Monotone Class
Lecture 5 - Random Experiment, Events
Lecture 6 - Definitions of Probability
Lecture 7 - Properties of Probability Function - I
Lecture 8 - Properties of Probability Function - II
Lecture 9 - Conditional Probability
Lecture 10 - Independence of Events
Lecture 11 - Problems in Probability - I
Lecture 12 - Problems in Probability - II
Lecture 13 - Random Variables
Lecture 14 - Probability Distribution of a Random Variable - I
Lecture 15 - Probability Distribution of a Random Variable - II
Lecture 16 - Moments
Lecture 17 - Characteristics of Distributions - I
Lecture 18 - Characteristics of Distributions - II
Lecture 19 - Special Discrete Distributions - I
Lecture 20 - Special Discrete Distributions - II
Lecture 21 - Special Discrete Distributions - III
Lecture 22 - Poisson Process - I
Lecture 23 - Poisson Process - II
Lecture 24 - Special Continuous Distributions - I
Lecture 25 - Special Continuous Distributions - II
Lecture 26 - Special Continuous Distributions - III
Lecture 27 - Special Continuous Distributions - IV
Lecture 28 - Special Continuous Distributions - V
Lecture 29 - Normal Distribution

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

- Lecture 30 - Problems on Normal Distribution
- Lecture 31 - Problems on Special Distributions - I
- Lecture 32 - Problems on Special Distributions - II
- Lecture 33 - Function of a random variable - I
- Lecture 34 - Function of a random variable - II
- Lecture 35 - Joint Distributions - I
- Lecture 36 - Joint Distributions - II
- Lecture 37 - Independence, Product Moments
- Lecture 38 - Linearity Property of Correlation and Examples
- Lecture 39 - Bivariate Normal Distribution - I
- Lecture 40 - Bivariate Normal Distribution - II
- Lecture 41 - Additive Properties of Distributions - I
- Lecture 42 - Additive Properties of Distributions - II
- Lecture 43 - Transformation of Random Variables
- Lecture 44 - Distribution of Order Statistics
- Lecture 45 - Basic Concepts
- Lecture 46 - Chi-Square Distribution
- Lecture 47 - Chi-Square Distribution (Continued...), t-Distribution
- Lecture 48 - F-Distribution
- Lecture 49 - Descriptive Statistics - I
- Lecture 50 - Descriptive Statistics - II
- Lecture 51 - Descriptive Statistics - III
- Lecture 52 - Descriptive Statistics - IV
- Lecture 53 - Introduction to Estimation
- Lecture 54 - Unbiased and Consistent Estimators
- Lecture 55 - LSE, MME
- Lecture 56 - Examples on MME, MLE
- Lecture 57 - Examples on MLE - I
- Lecture 58 - Examples on MLE - II, MSE
- Lecture 59 - UMVUE, Sufficiency, Completeness
- Lecture 60 - Rao - Blackwell Theorem and Its Applications
- Lecture 61 - Confidence Intervals - I
- Lecture 62 - Confidence Intervals - II
- Lecture 63 - Confidence Intervals - III
- Lecture 64 - Confidence Intervals - IV
- Lecture 65 - Basic Definitions
- Lecture 66 - Two Types of Errors
- Lecture 67 - Neyman-Pearson Fundamental Lemma
- Lecture 68 - Applications of N-P Lemma - I

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

- Lecture 69 - Applications of N-P Lemma - II
- Lecture 70 - Testing for Normal Mean
- Lecture 71 - Testing for Normal Variance
- Lecture 72 - Large Sample Test for Variance and Two Sample Problem
- Lecture 73 - Paired t-Test
- Lecture 74 - Examples
- Lecture 75 - Testing Equality of Proportions
- Lecture 76 - Chi-Square Test for Goodness Fit - I
- Lecture 77 - Chi-Square Test for Goodness Fit - II
- Lecture 78 - Testing for Independence in rxc Contingency Table - I
- Lecture 79 - Testing for Independence in rxc Contingency Table - II

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

NPTEL Video Course - Mathematics - NOC:Applied Multivariate Statistical Modeling

Subject Co-ordinator - Dr J Maiti

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to Multivariate Statistical Modeling
- Lecture 2 - Introduction to Multivariate Statistical Modeling: Data types, models, and modeling
- Lecture 3 - Statistical approaches to model building
- Lecture 4 - Statistical approaches to model building (Continued...)
- Lecture 5 - Univariate Descriptive Statistics
- Lecture 6 - Univariate Descriptive Statistics (Continued...)
- Lecture 7 - Normal Distribution and Chi-squared Distribution
- Lecture 8 - t-distribution, F-distribution, and Central Limit Theorem
- Lecture 9 - Univariate Inferential Statistics: Estimation
- Lecture 10 - Univariate Inferential Statistics: Estimation (Continued...)
- Lecture 11 - Univariate Inferential Statistics: Hypothesis Testing
- Lecture 12 - Hypothesis Testing (Continued...): Decision Making Scenarios
- Lecture 13 - Multivariate Descriptive Statistics: Mean Vector
- Lecture 14 - Multivariate Descriptive Statistics: Covariance Matrix
- Lecture 15 - Multivariate Descriptive Statistics: Correlation Matrix
- Lecture 16 - Multivariate Descriptive Statistics: Relationship between correlation and covariance matrices
- Lecture 17 - Multivariate Normal Distribution
- Lecture 18 - Multivariate Normal Distribution (Continued...)
- Lecture 19 - Multivariate Normal Distribution (Continued...): Geometrical Interpretation
- Lecture 20 - Multivariate Normal Distribution (Continued...): Examining data for multivariate normal distribution
- Lecture 21 - Multivariate Inferential Statistics: Basics and Hotelling T-square statistic
- Lecture 22 - Multivariate Inferential Statistics: Confidence Region
- Lecture 23 - Multivariate Inferential Statistics: Simultaneous confidence interval and Hypothesis testing
- Lecture 24 - Multivariate Inferential Statistics: Hypothesis testing for equality of two population mean vectors
- Lecture 25 - Analysis of Variance (ANOVA)
- Lecture 26 - Analysis of Variance (ANOVA): Decomposition of Total sum of squares
- Lecture 27 - Analysis of Variance (ANOVA): Estimation of Parameters and Model Adequacy tests
- Lecture 28 - Two-way and Three-way Analysis of Variance (ANOVA)
- Lecture 29 - Tutorial ANOVA

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- Lecture 30 - Tutorial ANOVA (Continued...)
- Lecture 31 - Multivariate Analysis of Variance (MANOVA): Conceptual Model
- Lecture 32 - Multivariate Analysis of Variance (MANOVA): Assumptions and Decomposition of total sum square and cross products
- Lecture 33 - Multivariate Analysis of Variance (MANOVA): Decomposition of total sum square and cross products
- Lecture 34 - Multivariate Analysis of Variance (MANOVA): Estimation and Hypothesis testing
- Lecture 35 - MANOVA Case Study
- Lecture 36 - Multiple Linear Regression: Introduction
- Lecture 37 - Multiple Linear Regression: Assumptions and Estimation of model parameters
- Lecture 38 - Multiple Linear Regression: Sampling Distribution of parameter estimates
- Lecture 39 - Multiple Linear Regression: Sampling Distribution of parameter estimates (Continued...)
- Lecture 40 - Multiple Linear Regression: Model Adequacy Tests
- Lecture 41 - Multiple Linear Regression: Model Adequacy Tests (Continued...)
- Lecture 42 - Multiple Linear Regression: Test of Assumptions
- Lecture 43 - MLR-Model diagnostics
- Lecture 44 - MLR-case study
- Lecture 45 - Multivariate Linear Regression: Conceptual model and assumptions
- Lecture 46 - Multivariate Linear Regression: Estimation of parameters
- Lecture 47 - Multivariate Linear Regression: Estimation of parameters (Continued...)
- Lecture 48 - Multiple Linear Regression: Sampling Distribution of parameter estimates
- Lecture 49 - Multivariate Linear Regression: Model Adequacy Tests
- Lecture 50 - Multiple Linear Regression: Model Adequacy Tests (Continued...)
- Lecture 51 - Regression modeling using SPSS
- Lecture 52 - Principal Component Analysis (PCA): Conceptual Model
- Lecture 53 - Principal Component Analysis (PCA): Extraction of Principal components (PCs)
- Lecture 54 - Principal Component Analysis (PCA): Model Adequacy and Interpretation
- Lecture 55 - Principal Component Analysis (PCA): Model Adequacy and Interpretation (Continued...)
- Lecture 56 - Factor Analysis: Basics and Orthogonal factor models
- Lecture 57 - Factor Analysis: Types of models and key questions
- Lecture 58 - Factor Analysis: Parameter Estimation
- Lecture 59 - Factor Analysis: Parameter Estimation (Continued...)
- Lecture 60 - Factor Analysis: Model Adequacy tests and factor rotation
- Lecture 61 - Factor Analysis: Factor scores and case study

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

NPTEL Video Course - Mathematics - NOC:Partial Differential Equations (PDE) for Engineers: Solution by Separation of Variables

Subject Co-ordinator - Prof. S. De

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction to PDE

Lecture 2 - Classification of PDE

Lecture 3 - Principle of Linear Superposition

Lecture 4 - Standard Eigen Value Problem and Special ODEs

Lecture 5 - Adjoint Operator

Lecture 6 - Generalized Sturm - Liouville Problem

Lecture 7 - Properties of Adjoint Operator

Lecture 8 - Separation of Variables

Lecture 9 - Solution of 3 Dimensional Parabolic Problem

Lecture 10 - Solution of 4 Dimensional Parabolic problem

Lecture 11 - Solution of 4 Dimensional Parabolic Problem (Continued...)

Lecture 12 - Solution of Elliptical PDE

Lecture 13 - Solution of Hyperbolic PDE

Lecture 14 - Orthogonality of Bessel Function and 2 Dimensional Cylindrical Coordinate System

Lecture 15 - Cylindrical Co-ordinate System - 3 Dimensional Problem

Lecture 16 - Spherical Polar Coordinate System

Lecture 17 - Spherical Polar Coordinate System (Continued...)

Lecture 18 - Example of Generalized 3 Dimensional Problem

Lecture 19 - Example of Application Oriented Problems

Lecture 20 - Examples of Application Oriented Problems (Continued...)

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NPTEL Video Course - Mathematics - NOC: Introductory Course in Real Analysis

Subject Co-ordinator - Prof. P.D. Srivastava

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Countable and Uncountable sets
- Lecture 2 - Properties of Countable and Uncountable sets
- Lecture 3 - Examples of Countable and Uncountable sets
- Lecture 4 - Concepts of Metric Space
- Lecture 5 - Open ball, Closed ball, Limit point of a set
- Lecture 6 - Tutorial-I
- Lecture 7 - Some theorems on Open and Closed sets
- Lecture 8 - Ordered set, Least upper bound, Greatest lower bound of a set
- Lecture 9 - Ordered set, Least upper bound, Greatest lower bound of a set (Continued...)
- Lecture 10 - Compact Set
- Lecture 11 - Properties of Compact sets
- Lecture 12 - Tutorial-II
- Lecture 13 - Heine Borel Theorem
- Lecture 14 - Weierstrass Theorem
- Lecture 15 - Cantor set and its properties
- Lecture 16 - Derived set and Dense set
- Lecture 17 - Limit of a sequence and monotone sequence
- Lecture 18 - Tutorial-III
- Lecture 19 - Some Important limits of sequences
- Lecture 20 - Ratio Test Cauchy's theorems on limits of sequences of real numbers
- Lecture 21 - Fundamental theorems on limits
- Lecture 22 - Some results on limits and Bolzano-Weierstrass Theorem
- Lecture 23 - Criteria for convergent sequence
- Lecture 24 - Tutorial-IV
- Lecture 25 - Criteria for Divergent Sequence
- Lecture 26 - Cauchy Sequence
- Lecture 27 - Cauchy Convergence Criteria for Sequences
- Lecture 28 - Infinite Series of Real Numbers
- Lecture 29 - Convergence Criteria for Series of Positive Real Numbers

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- Lecture 30 - Tutorial-V
- Lecture 31 - Comparison Test for Series
- Lecture 32 - Absolutely and Conditionally Convergent Series
- Lecture 33 - Rearrangement Theorem and Test for Convergence of Series
- Lecture 34 - Ratio and Integral Test for Convergence of Series
- Lecture 35 - Raabe's Test for Convergence of Series
- Lecture 36 - Tutorial-VI
- Lecture 37 - Limit of Functions and Cluster Point
- Lecture 38 - Limit of Functions (Continued...)
- Lecture 39 - Divergence Criteria for Limit
- Lecture 40 - Various Properties of Limit of Functions
- Lecture 41 - Left and Right Hand Limits for Functions
- Lecture 42 - Tutorial-VII
- Lecture 43 - Limit of Functions at Infinity
- Lecture 44 - Continuous Functions (Cauchy's Definition)
- Lecture 45 - Continuous Functions (Heine's Definition)
- Lecture 46 - Properties of Continuous Functions
- Lecture 47 - Properties of Continuous Functions (Continued...)
- Lecture 48 - Tutorial-VIII
- Lecture 49 - Boundness Theorem and Max-Min Theorem
- Lecture 50 - Location of Root and Bolzano's Theorem
- Lecture 51 - Uniform Continuity and Related Theorems
- Lecture 52 - Absolute Continuity and Related Theorems
- Lecture 53 - Types of Discontinuities
- Lecture 54 - Tutorial-IX
- Lecture 55 - Types of Discontinuities (Continued...)
- Lecture 56 - Relation between Continuity and Compact Sets
- Lecture 57 - Differentiability of Real Valued Functions
- Lecture 58 - Local Max. - Min. Cauchy's and Lagrange's Mean Value Theorem
- Lecture 59 - Rolle's Mean Value Theorems and Its Applications
- Lecture 60 - Tutorial-X
- Lecture 61
- Lecture 62
- Lecture 63
- Lecture 64
- Lecture 65
- Lecture 66
- Lecture 67
- Lecture 68

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Lecture 69
Lecture 70
Lecture 71
Lecture 72
Lecture 73

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NPTEL Video Course - Mathematics - NOC:Modeling Transport Phenomena of Microparticles

Subject Co-ordinator - Dr. G.P. Raja Sekhar, Prof. Somnath Bhattacharyya

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Preliminary concepts
- Lecture 2 - Cauchy's equation of motion and Navier-Stokes equations
- Lecture 3 - Reduced forms of Navier-Stokes equations and Boundary conditions
- Lecture 4 - Exact solutions of Navier-Stokes equations in particular cases
- Lecture 5 - Dimensional Analysis - Non-dimensionalization of Navier-Stokes's equations
- Lecture 6 - Stream function formulation of Navier-Stokes equations
- Lecture 7 - Stokes flow past a cylinder
- Lecture 8 - Stokes flow past a sphere
- Lecture 9 - Elementary Lubrication Theory
- Lecture 10 - Hydrodynamics of Squeeze flow
- Lecture 11 - Solution of arbitrary Stokes flows
- Lecture 12 - Mechanics of Swimming Microorganisms
- Lecture 13 - Viscous flow past a spherical drop
- Lecture 14 - Migration of a viscous drop under Marangoni effects
- Lecture 15 - Singularities of Stokes flows
- Lecture 16 - Introduction to porous media
- Lecture 17 - Flow through porous media - elementary geometries
- Lecture 18 - Flow through composite porous channels
- Lecture 19 - Modeling transport of particles inside capillaries
- Lecture 20 - Modeling transport of microparticles - some applications
- Lecture 21 - Introduction to Electrokinetics
- Lecture 22 - Basics on Electrostatics
- Lecture 23 - Transport Equations for Electrokinetics, Part-I
- Lecture 24 - Transport Equations for Electrokinetics, Part-II
- Lecture 25 - Electric Double Layer
- Lecture 26 - Electroosmotic flow (EOF) of ionized fluid
- Lecture 27 - EOF in micro-channel
- Lecture 28 - Non-linear EOF, Overlapping Debye Layer
- Lecture 29 - Two-dimensional EOF

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- Lecture 30 - EOF near heterogeneous surface potential
- Lecture 31 - Electroosmosis in hydrophobic surface
- Lecture 32 - Numerical Methods for Boundary Value Problems (BVP)
- Lecture 33 - Numerical Methods for nonlinear BVP
- Lecture 34 - Numerical Methods for coupled set of BVP
- Lecture 35 - Numerical Methods for PDEs
- Lecture 36 - Numerical Methods for transport equations, Part-I
- Lecture 37 - Numerical Methods for transport equations, Part-II
- Lecture 38 - Electrophoresis of charged colloids, Part-I
- Lecture 39 - Electrophoresis of charged colloids, Part-II
- Lecture 40 - Gel Electrophoresis

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

NPTEL Video Course - Mathematics - NOC:Constrained and Unconstrained Optimization

Subject Co-ordinator - Dr. Debjani Chakraborty, Prof. A. Goswami

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction to Optimization
Lecture 2 - Assumptions and Mathematical Modeling of LPP
Lecture 3 - Geometrey of LPP
Lecture 4 - Graphical Solution of LPP - I
Lecture 5 - Graphical Solution of LPP - II
Lecture 6 - Solution of LPP
Lecture 7 - Simplex Method
Lecture 8 - Introduction to BIG-M Method
Lecture 9 - Algorithm of BIG-M Method
Lecture 10 - Problems on BIG-M Method
Lecture 11 - Two Phase Method
Lecture 12 - Two Phase Method
Lecture 13 - Special Cases of LPP
Lecture 14 - Degeneracy in LPP
Lecture 15 - Sensitivity Analysis - I
Lecture 16 - Sensitivity Analysis - II
Lecture 17 - Problems on Sensitivity Analysis
Lecture 18 - Introduction to Duality Theory - I
Lecture 19 - Introduction to Duality Theory - II
Lecture 20 - Dual Simplex Method
Lecture 21 - Examples on Dual Simplex Method
Lecture 22 - Interger Linear Programming
Lecture 23 - Interger Linear Programming
Lecture 24 - IPP
Lecture 25 - Mixed Integer Programming Problem
Lecture 26
Lecture 27
Lecture 28
Lecture 29

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- Lecture 30
- Lecture 31 - Introduction to Nonlinear programming
- Lecture 32 - Graphical Solution of NLP
- Lecture 33 - Types of NLP
- Lecture 34 - One dimensional unconstrained optimization
- Lecture 35 - Unconstrained Optimization
- Lecture 36 - Region Elimination Technique - 1
- Lecture 37 - Region Elimination Technique - 2
- Lecture 38 - Region Elimination Technique - 3
- Lecture 39 - Unconstrained Optimization
- Lecture 40 - Unconstrained Optimization
- Lecture 41 - Multivariate Unconstrained Optimization - 1
- Lecture 42 - Multivariate Unconstrained Optimization - 2
- Lecture 43 - Unconstrained Optimization
- Lecture 44 - NLP with Equality Constrained - 1
- Lecture 45 - NLP with Equality Constrained - 2
- Lecture 46 - Constrained NLP - 1
- Lecture 47 - Constrained NLP - 2
- Lecture 48 - Constrained Optimization
- Lecture 49 - Constrained Optimization
- Lecture 50 - KKT
- Lecture 51 - Constrained Optimization
- Lecture 52 - Constrained Optimization
- Lecture 53 - Feasible Direction
- Lecture 54 - Penalty and barrier method
- Lecture 55 - Penalty method
- Lecture 56 - Penalty and barrier method
- Lecture 57 - Penalty and barrier method
- Lecture 58 - Dynamic programming
- Lecture 59 - Multi-Objective decision making
- Lecture 60 - Multi-Attribute decision making

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NPTEL Video Course - Mathematics - NOC:Matrix Solver

Subject Co-ordinator - Prof. Somnath Roy

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to Matrix Algebra - I
- Lecture 2 - Introduction to Matrix Algebra - II
- Lecture 3 - System of Linear Equations
- Lecture 4 - Determinant of a Matrix
- Lecture 5 - Determinant of a Matrix (Continued...)
- Lecture 6 - Gauss Elimination
- Lecture 7 - Gauss Elimination (Continued...)
- Lecture 8 - LU Decomposition
- Lecture 9 - Gauss-Jordan Method
- Lecture 10 - Representation of Physical Systems as Matrix Equations
- Lecture 11 - Tridiagonal Matrix Algorithm
- Lecture 12 - Equations with Singular Matrices
- Lecture 13 - Introduction to Vector Space
- Lecture 14 - Vector Subspace
- Lecture 15 - Column Space and Nullspace of a Matrix
- Lecture 16 - Finding Null Space of a Matrix
- Lecture 17 - Solving $Ax=b$ when A is Singular
- Lecture 18 - Linear Independence and Spanning of a Subspace
- Lecture 19 - Basis and Dimension of a Vector Space
- Lecture 20 - Four Fundamental Subspaces of a Matrix
- Lecture 21 - Left and right inverse of a matrix
- Lecture 22 - Orthogonality between the subspaces
- Lecture 23 - Best estimate
- Lecture 24 - Projection operation and linear transformation
- Lecture 25 - Creating orthogonal basis vectors
- Lecture 26 - Gram-Schmidt and modified Gram-Schmidt algorithms
- Lecture 27 - Comparing GS and modified GS
- Lecture 28 - Introduction to eigenvalues and eigenvectors
- Lecture 29 - Eigenvalues and eigenvectors for real symmetric matrix

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- Lecture 30 - Positive definiteness of a matrix
- Lecture 31 - Positive definiteness of a matrix (Continued...)
- Lecture 32 - Basic Iterative Methods
- Lecture 33 - Basic Iterative Methods
- Lecture 34 - Convergence Rate and Convergence Factor for Iterative Methods
- Lecture 35 - Numerical Experiments on Convergence
- Lecture 36 - Steepest Descent Method
- Lecture 37 - Steepest Descent Method
- Lecture 38 - Steepest Descent Method
- Lecture 39 - Introduction to General Projection Methods
- Lecture 40 - Residue Norm and Minimum Residual Algorithm
- Lecture 41 - Developing computer programs for basic iterative methods
- Lecture 42 - Developing computer programs for projection based methods
- Lecture 43 - Introduction to Krylov subspace methods
- Lecture 44 - Krylov subspace methods for linear systems
- Lecture 45 - Iterative methods for solving linear systems using Krylov subspace methods
- Lecture 46 - Conjugate gradient methods
- Lecture 47 - Conjugate gradient methods (Continued...)
- Lecture 48 - Conjugate gradient methods (Continued...) and Introduction to GMRES
- Lecture 49 - GMRES (Continued...)
- Lecture 50 - Lanczos Biorthogonalization and BCG Algorithm
- Lecture 51 - Numerical issues in BICG and polynomial based formulation
- Lecture 52 - Conjugate gradient squared and Biconjugate gradient stabilized
- Lecture 53 - Line relaxation method
- Lecture 54 - Block relaxation method
- Lecture 55 - Domain Decomposition and Parallel Computing
- Lecture 56 - Preconditioners
- Lecture 57 - Preconditioned conjugate gradient
- Lecture 58 - Preconditioned GMRES
- Lecture 59 - Multigrid methods - I
- Lecture 60 - Multigrid methods - II

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

NPTEL Video Course - Mathematics - NOC:Introduction to Abstract and Linear Algebra

Subject Co-ordinator - Prof.Sourav Mukhopadhyay

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Set Theory
Lecture 2 - Set Operations
Lecture 3 - Set Operations (Continued...)
Lecture 4 - Set of sets
Lecture 5 - Binary relation
Lecture 6 - Equivalence relation
Lecture 7 - Mapping
Lecture 8 - Permutation
Lecture 9 - Binary Composition
Lecture 10 - Groupoid
Lecture 11 - Group
Lecture 12 - Order of an element
Lecture 13 - Subgroup
Lecture 14 - Cyclic Group
Lecture 15 - Subgroup Operations
Lecture 16 - Left Cosets
Lecture 17 - Right Cosets
Lecture 18 - Normal Subgroup
Lecture 19 - Rings
Lecture 20 - Field
Lecture 21 - Vector Spaces
Lecture 22 - Sub-Spaces
Lecture 23 - Linear Span
Lecture 24 - Basis of a Vector Space
Lecture 25 - Dimension of a Vector space
Lecture 26 - Complement of subspace
Lecture 27 - Linear Transformation
Lecture 28 - Linear Transformation (Continued...)
Lecture 29 - More on linear mapping

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- Lecture 30 - Linear Space
- Lecture 31 - Rank of a matrix
- Lecture 32 - Rank of a matrix (Continued...)
- Lecture 33 - System of linear equations
- Lecture 34 - Row rank and Column rank
- Lecture 35 - Eigen value of a matrix
- Lecture 36 - Eigen Vector
- Lecture 37 - Geometric multiplicity
- Lecture 38 - More on eigen value
- Lecture 39 - Similar matrices
- Lecture 40 - Diagonalisable

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

NPTEL Video Course - Mathematics - NOC:Engineering Mathematics-I

Subject Co-ordinator - Prof. Jitendra Kumar

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Rolle's Theorem

Lecture 2 - Mean Value Theorems

Lecture 3 - Indeterminate Forms - Part 1

Lecture 4 - Indeterminate Forms - Part 2

Lecture 5 - Taylor Polynomial and Taylor Series

Lecture 6 - Limit of Functions of Two Variables

Lecture 7 - Evaluation of Limit of Functions of Two Variables

Lecture 8 - Continuity of Functions of Two Variables

Lecture 9 - Partial Derivatives of Functions of Two Variables

Lecture 10 - Partial Derivatives of Higher Order

Lecture 11 - Derivative and Differentiability

Lecture 12 - Differentiability of Functions of Two Variables

Lecture 13 - Differentiability of Functions of Two Variables (Continued...)

Lecture 14 - Differentiability of Functions of Two Variables (Continued...)

Lecture 15 - Composite and Homogeneous Functions

Lecture 16 - Taylor's Theorem for Functions of Two Variables

Lecture 17 - Maxima and Minima of Functions of Two Variables

Lecture 18 - Maxima and Minima of Functions of Two Variables (Continued...)

Lecture 19 - Maxima and Minima of Functions of Two Variables (Continued...)

Lecture 20 - Constrained Maxima and Minima

Lecture 21 - Improper Integrals

Lecture 22 - Improper Integrals (Continued...)

Lecture 23 - Improper Integrals (Continued...)

Lecture 24 - Improper Integrals (Continued...)

Lecture 25 - Beta and Gamma Function

Lecture 26 - Beta and Gamma Function (Continued...)

Lecture 27 - Differentiation Under Integral Sign

Lecture 28 - Double Integrals

Lecture 29 - Double Integrals (Continued...)

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

- Lecture 30 - Double Integrals (Continued...)
- Lecture 31 - Integral Calculus Double Integrals in Polar Form
- Lecture 32 - Integral Calculus Double Integrals
- Lecture 33 - Integral Calculus Double Integrals
- Lecture 34 - Integral Calculus Triple Integrals
- Lecture 35 - Integral Calculus Triple Integrals (Continued...)
- Lecture 36 - System of Linear Equations
- Lecture 37 - System of Linear Equations Gauss Elimination
- Lecture 38 - System of Linear Equations Gauss Elimination (Continued...)
- Lecture 39 - Linear Algebra - Vector Spaces
- Lecture 40 - Linear Independence of Vectors
- Lecture 41 - Vector Spaces Spanning Set
- Lecture 42 - Vector Spaces Basis and Dimension
- Lecture 43 - Rank of a Matrix
- Lecture 44 - Linear Transformations
- Lecture 45 - Linear Transformations (Continued...)
- Lecture 46 - Eigenvalues and Eigenvectors
- Lecture 47 - Eigenvalues and Eigenvectors (Continued...)
- Lecture 48 - Eigenvalues and Eigenvectors (Continued...)
- Lecture 49 - Eigenvalues and Eigenvectors (Continued...)
- Lecture 50 - Eigenvalues and Eigenvectors
- Lecture 51 - Differential Equations - Introduction
- Lecture 52 - First Order Differential Equations
- Lecture 53 - Exact Differential Equations
- Lecture 54 - Exact Differential Equations (Continued...)
- Lecture 55 - First Order Linear Differential Equations
- Lecture 56 - Higher Order Linear Differential Equations
- Lecture 57 - Solution of Higher Order Homogeneous Linear Equations
- Lecture 58 - Solution of Higher Order Non-Homogeneous Linear Equations
- Lecture 59 - Solution of Higher Order Non-Homogeneous Linear Equations (Continued...)
- Lecture 60 - Cauchy-Euler Equations

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

NPTEL Video Course - Mathematics - NOC: Integral and Vector Calculus

Subject Co-ordinator - Prof. Hari Shankar Mahato

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Partition, Riemann integrability and One example
- Lecture 2 - Partition, Riemann integrability and One example (Continued...)
- Lecture 3 - Condition of integrability
- Lecture 4 - Theorems on Riemann integrations
- Lecture 5 - Examples
- Lecture 6 - Examples (Continued...)
- Lecture 7 - Reduction formula
- Lecture 8 - Reduction formula (Continued...)
- Lecture 9 - Improper Integral
- Lecture 10 - Improper Integral (Continued...)
- Lecture 11 - Improper Integral (Continued...)
- Lecture 12 - Improper Integral (Continued...)
- Lecture 13 - Introduction to Beta and Gamma Function
- Lecture 14 - Beta and Gamma Function
- Lecture 15 - Differentiation under Integral Sign
- Lecture 16 - Differentiation under Integral Sign (Continued...)
- Lecture 17 - Double Integral
- Lecture 18 - Double Integral over a Region E
- Lecture 19 - Examples of Integral over a Region E
- Lecture 20 - Change of variables in a Double Integral
- Lecture 21 - Change of order of Integration
- Lecture 22 - Triple Integral
- Lecture 23 - Triple Integral (Continued...)
- Lecture 24 - Area of Plane Region
- Lecture 25 - Area of Plane Region (Continued...)
- Lecture 26 - Rectification
- Lecture 27 - Rectification (Continued...)
- Lecture 28 - Surface Integral
- Lecture 29 - Surface Integral (Continued...)

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NPTTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

- Lecture 30 - Surface Integral (Continued...)
- Lecture 31 - Volume Integral, Gauss Divergence Theorem
- Lecture 32 - Vector Calculus
- Lecture 33 - Limit, Continuity, Differentiability
- Lecture 34 - Successive Differentiation
- Lecture 35 - Integration of Vector Function
- Lecture 36 - Gradient of a Function
- Lecture 37 - Divergence and Curl
- Lecture 38 - Divergence and Curl Examples
- Lecture 39 - Divergence and Curl important Identities
- Lecture 40 - Level Surface Relevant Theorems
- Lecture 41 - Directional Derivative (Concept and Few Results)
- Lecture 42 - Directional Derivative (Concept and Few Results) (Continued...)
- Lecture 43 - Directional Derivatives, Level Surfaces
- Lecture 44 - Application to Mechanics
- Lecture 45 - Equation of Tangent, Unit Tangent Vector
- Lecture 46 - Unit Normal, Unit binormal, Equation of Normal Plane
- Lecture 47 - Introduction and Derivation of Serret-Frenet Formula, few results
- Lecture 48 - Example on binormal, normal tangent, Serret-Frenet Formula
- Lecture 49 - Osculating Plane, Rectifying plane, Normal plane
- Lecture 50 - Application to Mechanics, Velocity, speed, acceleration
- Lecture 51 - Angular Momentum, Newton's Law
- Lecture 52 - Example on derivation of equation of motion of particle
- Lecture 53 - Line Integral
- Lecture 54 - Surface integral
- Lecture 55 - Surface integral (Continued...)
- Lecture 56 - Green's Theorem and Example
- Lecture 57 - Volume integral, Gauss theorem
- Lecture 58 - Gauss divergence theorem
- Lecture 59 - Stoke's Theorem
- Lecture 60 - Overview of Course

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

NPTEL Video Course - Mathematics - NOC:Transform Calculus and its applications in Differential Equations

Subject Co-ordinator - Prof. A. Goswami

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction to Integral Transform and Laplace Transform

Lecture 2 - Existence of Laplace Transform

Lecture 3 - Shifting Properties of Laplace Transform

Lecture 4 - Laplace Transform of Derivatives and Integration of a Function - I

Lecture 5 - Laplace Transform of Derivatives and Integration of a Function - II

Lecture 6 - Explanation of properties of Laplace Transform using Examples

Lecture 7 - Laplace Transform of Periodic Function

Lecture 8 - Laplace Transform of some special Functions

Lecture 9 - Error Function, Dirac Delta Function and their Laplace Transform

Lecture 10 - Bessel Function and its Laplace Transform

Lecture 11 - Introduction to Inverse Laplace Transform

Lecture 12 - Properties of Inverse Laplace Transform

Lecture 13 - Convolution and its Applications

Lecture 14 - Evaluation of Integrals using Laplace Transform

Lecture 15 - Solution of Ordinary Differential Equations with constant coefficients using Laplace Transform

Lecture 16 - Solution of Ordinary Differential Equations with variable coefficients using Laplace Transform

Lecture 17 - Solution of Simultaneous Ordinary Differential Equations using Laplace Transform

Lecture 18 - Introduction to Integral Equation and its Solution Process

Lecture 19 - Introduction to Fourier Series

Lecture 20 - Fourier Series for Even and Odd Functions

Lecture 21 - Fourier Series of Functions having arbitrary period - I

Lecture 22 - Fourier Series of Functions having arbitrary period - II

Lecture 23 - Half Range Fourier Series

Lecture 24 - Parseval's Theorem and its Applications

Lecture 25 - Complex form of Fourier Series

Lecture 26 - Fourier Integral Representation

Lecture 27 - Introduction to Fourier Transform

Lecture 28 - Derivation of Fourier Cosine Transform and Fourier Sine Transform of Functions

Lecture 29 - Evaluation of Fourier Transform of various functions

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- Lecture 30 - Linearity Property and Shifting Properties of Fourier Transform
- Lecture 31 - Change of Scale and Modulation Properties of Fourier Transform
- Lecture 32 - Fourier Transform of Derivative and Integral of a Function
- Lecture 33 - Applications of Properties of Fourier Transform - I
- Lecture 34 - Applications of Properties of Fourier Transform - II
- Lecture 35 - Fourier Transform of Convolution of two functions
- Lecture 36 - Parseval's Identity and its Application
- Lecture 37 - Evaluation of Definite Integrals using Properties of Fourier Transform
- Lecture 38 - Fourier Transform of Dirac Delta Function
- Lecture 39 - Representation of a function as Fourier Integral
- Lecture 40 - Applications of Fourier Transform to Ordinary Differential Equations - I
- Lecture 41 - Applications of Fourier Transform to Ordinary Differential Equations - II
- Lecture 42 - Solution of Integral Equations using Fourier Transform
- Lecture 43 - Introduction to Partial Differential Equations
- Lecture 44 - Solution of Partial Differential Equations using Laplace Transform
- Lecture 45 - Solution of Heat Equation and Wave Equation using Laplace Transform
- Lecture 46 - Criteria for choosing Fourier Transform, Fourier Sine Transform, Fourier Cosine Transform in solving PDEs
- Lecture 47 - Solution of Partial Differential Equations using Fourier Cosine Transform and Fourier Sine Transform
- Lecture 48 - Solution of Partial Differential Equations using Fourier Transform - I
- Lecture 49 - Solution of Partial Differential Equations using Fourier Transform - II
- Lecture 50 - Solving problems on Partial Differential Equations using Transform Techniques
- Lecture 51 - Introduction to Finite Fourier Transform
- Lecture 52 - Solution of Boundary Value Problems using Finite Fourier Transform - I
- Lecture 53 - Solution of Boundary Value Problems using Finite Fourier Transform - II
- Lecture 54 - Introduction to Mellin Transform
- Lecture 55 - Properties of Mellin Transform
- Lecture 56 - Examples of Mellin Transform - I
- Lecture 57 - Examples of Mellin Transform - II
- Lecture 58 - Introduction to Z-Transform
- Lecture 59 - Properties of Z-Transform
- Lecture 60 - Evaluation of Z-Transform of some functions

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NPTEL Video Course - Mathematics - NOC:Statistical Inference (2019)

Subject Co-ordinator - Prof. Somesh Kumar

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction and Motivation - I
Lecture 2 - Introduction and Motivation - II
Lecture 3 - Basic Concepts of Point Estimations - I
Lecture 4 - Basic Concepts of Point Estimations - II
Lecture 5 - Basic Concepts of Point Estimations - III
Lecture 6 - Basic Concepts of Point Estimations - IV
Lecture 7 - Finding Estimators - I
Lecture 8 - Finding Estimators - II
Lecture 9 - Finding Estimators - III
Lecture 10 - Finding Estimators - IV
Lecture 11 - Finding Estimators - V
Lecture 12 - Finding Estimators - VI
Lecture 13 - Properties of MLEs - I
Lecture 14 - Properties of MLEs - II
Lecture 15 - Lower Bounds for Variance - I
Lecture 16 - Lower Bounds for Variance - II
Lecture 17 - Lower Bounds for Variance - III
Lecture 18 - Lower Bounds for Variance - IV
Lecture 19 - Lower Bounds for Variance - V
Lecture 20 - Lower Bounds for Variance - VI
Lecture 21 - Lower Bounds for Variance - VII
Lecture 22 - Lower Bounds for Variance - VIII
Lecture 23 - Sufficiency - I
Lecture 24 - Sufficiency - II
Lecture 25 - Sufficiency and Information - I
Lecture 26 - Sufficiency and Information - II
Lecture 27 - Minimal Sufficiency, Completeness - I
Lecture 28 - Minimal Sufficiency, Completeness - II
Lecture 29 - UMVU Estimation, Ancillarity - I

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- Lecture 30 - UMVU Estimation, Ancillarity - II
- Lecture 31 - Testing of Hypotheses
- Lecture 32 - Testing of Hypotheses
- Lecture 33 - Neyman Pearson Fundamental Lemma - I
- Lecture 34 - Neyman Pearson Fundamental Lemma - II
- Lecture 35 - Application of NP-Lemma - I
- Lecture 36 - Application of NP-Lemma - II
- Lecture 37 - UMP Tests - I
- Lecture 38 - UMP Tests - II
- Lecture 39 - UMP Tests - III
- Lecture 40 - UMP Tests - IV
- Lecture 41 - UMP Unbiased Tests - I
- Lecture 42 - UMP Unbiased Tests - II
- Lecture 43 - UMP Unbiased Tests - III
- Lecture 44 - UMP Unbiased Tests - IV
- Lecture 45 - Applications of UMP Unbiased Tests - I
- Lecture 46 - Applications of UMP Unbiased Tests - II
- Lecture 47 - Unbiased Test for Normal Populations - I
- Lecture 48 - Unbiased Test for Normal Populations - II
- Lecture 49 - Unbiased Test for Normal Populations - III
- Lecture 50 - Unbiased Test for Normal Populations - IV
- Lecture 51 - Likelihood Ratio Tests - I
- Lecture 52 - Likelihood Ratio Tests - II
- Lecture 53 - Likelihood Ratio Tests - III
- Lecture 54 - Likelihood Ratio Tests - IV
- Lecture 55 - Likelihood Ratio Tests - V
- Lecture 56 - Likelihood Ratio Tests - VI
- Lecture 57 - Likelihood Ratio Tests - VII
- Lecture 58 - Likelihood Ratio Tests - VIII
- Lecture 59 - Test for Goodness of Fit - I
- Lecture 60 - Test for Goodness of Fit - II
- Lecture 61 - Interval Estimation - I
- Lecture 62 - Interval Estimation - II
- Lecture 63 - Interval Estimation - III
- Lecture 64 - Interval Estimation - IV

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NPTEL Video Course - Mathematics - NOC:Mathematical Methods for Boundary Value Problems

Subject Co-ordinator - Prof. Somnath Bhattacharyya

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Sturm-Liouville Problems, Linear BVP

Lecture 2 - Sturm-Liouville Problems, Linear BVP (Continued...)

Lecture 3 - Solution of BVPs by Eigen function expansion

Lecture 4 - Solution of BVPs by Eigen function expansion (Continued...)

Lecture 5 - Solutions of linear parabolic, hyperbolic and elliptic PDEs with finite domain by Eigen function

Lecture 6 - Solutions of linear parabolic, hyperbolic and elliptic PDEs with finite domain by Eigen function

Lecture 7 - Green's Function for BVP and Dirichlet Problem

Lecture 8 - Green's Function for BVP and Dirichlet Problem (Continued...)

Lecture 9 - Numerical Techniques for IVP; Shooting Method for BVP

Lecture 10 - Numerical Techniques for IVP; Shooting Method for BVP (Continued...)

Lecture 11 - Finite difference methods for linear BVP; Thomas Algorithm

Lecture 12 - Finite difference methods for linear BVP; Thomas Algorithm (Continued...)

Lecture 13 - Finite difference method for Higher-order BVP; Block tri-diagonal System

Lecture 14 - Finite difference method for Higher-order BVP; Block tri-diagonal System (Continued...)

Lecture 15 - Iterative methods for nonlinear BVP; Control volume formulation

Lecture 16 - Iterative methods for nonlinear BVP; Control volume formulation (Continued...)

Lecture 17 - Implicit scheme; Truncation error; Crank-Nicolson scheme

Lecture 18 - Implicit scheme; Truncation error; Crank-Nicolson scheme (Continued...)

Lecture 19 - Stability analysis of numerical schemes

Lecture 20 - Alternating-Direction-Implicit Scheme; Successive-Over-Relaxation technique for Poisson equation

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NPTEL Video Course - Mathematics - NOC:Engineering Mathematics-II

Subject Co-ordinator - Prof. Jitendra Kumar

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Vector Functions
- Lecture 2 - Vector and Scalar Fields
- Lecture 3 - Divergence and Curl of a Vector Field
- Lecture 4 - Line Integrals
- Lecture 5 - Conservative Vector Field
- Lecture 6 - Green's Theorem
- Lecture 7 - Surface Integral - I
- Lecture 8 - Surface Integral - II
- Lecture 9 - Stokes's Theorem
- Lecture 10 - Divergence Theorem
- Lecture 11 - Complex Numbers and Functions
- Lecture 12 - Differentiability of Complex Functions
- Lecture 13 - Analytic Functions
- Lecture 14 - Line Integral
- Lecture 15 - Cauchy Integral Theorem
- Lecture 16 - Cauchy Integral Formula
- Lecture 17 - Taylor's Series
- Lecture 18 - Laurent's Series
- Lecture 19 - Singularities
- Lecture 20 - Residue
- Lecture 21 - Iterative Methods for Solving System of Linear Equations
- Lecture 22 - Iterative Methods for Solving System of Linear Equations (Continued...)
- Lecture 23 - Iterative Methods for Solving System of Linear Equations (Continued...)
- Lecture 24 - Roots of Algebraic and Transcendental Equations
- Lecture 25 - Roots of Algebraic and Transcendental Equations (Continued...)
- Lecture 26 - Polynomial Interpolation
- Lecture 27 - Polynomial Interpolation (Continued...)
- Lecture 28 - Polynomial Interpolation (Continued...)
- Lecture 29 - Polynomial Interpolation (Continued...)

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- Lecture 30 - Numerical Integration
- Lecture 31 - Trigonometric Polynomials and Series
- Lecture 32 - Derivation of Fourier Series
- Lecture 33 - Fourier Series -Evaluation
- Lecture 34 - Convergence of Fourier Series - I
- Lecture 35 - Convergence of Fourier Series - II
- Lecture 36 - Fourier Series for Even and Odd Functions
- Lecture 37 - Half Range Fourier Expansions
- Lecture 38 - Differentiation and Integration of Fourier Series
- Lecture 39 - Bessel's Inequality and Parseval's Identity
- Lecture 40 - Complex Form of Fourier Series
- Lecture 41 - Fourier Integral Representation of a Function
- Lecture 42 - Fourier Sine and Cosine Integrals
- Lecture 43 - Fourier Cosine and Sine Transform
- Lecture 44 - Fourier Transform
- Lecture 45 - Properties of Fourier Transform
- Lecture 46 - Evaluation of Fourier Transform - Part 1
- Lecture 47 - Evaluation of Fourier Transform - Part 2
- Lecture 48 - Introduction to Partial Differential Equations
- Lecture 49 - Applications of Fourier Transform to PDEs - Part 1
- Lecture 50 - Applications of Fourier Transform to PDEs - Part 2
- Lecture 51 - Laplace Transform of Some Elementary Functions
- Lecture 52 - Existence of Laplace Transform
- Lecture 53 - Inverse Laplace Transform
- Lecture 54 - Properties of Laplace Transform
- Lecture 55 - Properties of Laplace Transform (Continued...)
- Lecture 56 - Properties of Laplace Transform (Continued...)
- Lecture 57 - Laplace Transform of Special Functions
- Lecture 58 - Laplace Transform of Special Functions (Continued...)
- Lecture 59 - Applications of Laplace Transform
- Lecture 60 - Applications of Laplace Transform (Continued...)

NPTel Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTel Video Course - Mathematics - An Introduction to Riemann Surfaces and Algebraic Curves:
Complex 1-Tori and Elliptic Curves

Subject Co-ordinator - Dr. T.E. Venkata Balaji

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - The Idea of a Riemann Surface

Lecture 2 - Simple Examples of Riemann Surfaces

Lecture 3 - Maximal Atlases and Holomorphic Maps of Riemann Surfaces

Lecture 4 - A Riemann Surface Structure on a Cylinder

Lecture 5 - A Riemann Surface Structure on a Torus

Lecture 6 - Riemann Surface Structures on Cylinders and Tori via Covering Spaces

Lecture 7 - Moebius Transformations Make up Fundamental Groups of Riemann Surfaces

Lecture 8 - Homotopy and the First Fundamental Group

Lecture 9 - A First Classification of Riemann Surfaces

Lecture 10 - The Importance of the Path-lifting Property

Lecture 11 - Fundamental groups as Fibres of the Universal covering Space

Lecture 12 - The Monodromy Action

Lecture 13 - The Universal covering as a Hausdorff Topological Space

Lecture 14 - The Construction of the Universal Covering Map

Lecture 15 - Completion of the Construction of the Universal Covering

Lecture 16 - Completion of the Construction of the Universal Covering

Lecture 17 - The Riemann Surface Structure on the Topological Covering of a Riemann Surface

Lecture 18 - Riemann Surfaces with Universal Covering the Plane or the Sphere

Lecture 19 - Classifying Complex Cylinders

Lecture 20 - Characterizing Moebius Transformations with a Single Fixed Point

Lecture 21 - Characterizing Moebius Transformations with Two Fixed Points

Lecture 22 - Torsion-freeness of the Fundamental Group of a Riemann Surface

Lecture 23 - Characterizing Riemann Surface Structures on Quotients of the Upper Half-Plane with
Abelian Fundamental Groups

Lecture 24 - Classifying Annuli up to Holomorphic Isomorphism

Lecture 25 - Orbits of the Integral Unimodular Group in the Upper Half-Plane

Lecture 26 - Galois Coverings are precisely Quotients by Properly Discontinuous Free Actions

Lecture 27 - Local Actions at the Region of Discontinuity of a Kleinian Subgroup of Moebius Transformations

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- Lecture 28 - Quotients by Kleinian Subgroups give rise to Riemann Surfaces
- Lecture 29 - The Unimodular Group is Kleinian
- Lecture 30 - The Necessity of Elliptic Functions for the Classification of Complex Tori
- Lecture 31 - The Uniqueness Property of the Weierstrass Phe-function associated to a Lattice in the Plane
- Lecture 32 - The First Order Degree Two Cubic Ordinary Differential Equation satisfied by the Weierstrass Phe-function
- Lecture 33 - The Values of the Weierstrass Phe-function at the Zeros of its Derivative are nonvanishing Analytic Functions on the Upper Half-Plane
- Lecture 34 - The Construction of a Modular Form of Weight Two on the Upper Half-Plane
- Lecture 35 - The Fundamental Functional Equations satisfied by the Modular Form of Weight Two on the Upper Half-Plane
- Lecture 36 - The Weight Two Modular Form assumes Real Values on the Imaginary Axis in the Upper Half-plane
- Lecture 37 - The Weight Two Modular Form Vanishes at Infinity
- Lecture 38 - The Weight Two Modular Form Decays Exponentially in a Neighbourhood of Infinity
- Lecture 39 - A Suitable Restriction of the Weight Two Modular Form is a Holomorphic Conformal Isomorphism onto the Upper Half-Plane
- Lecture 40 - The J-Invariant of a Complex Torus (or) of an Algebraic Elliptic Curve
- Lecture 41 - A Fundamental Region in the Upper Half-Plane for the Elliptic Modular J-Invariant
- Lecture 42 - The Fundamental Region in the Upper Half-Plane for the Unimodular Group
- Lecture 43 - A Region in the Upper Half-Plane Meeting Each Unimodular Orbit Exactly Once
- Lecture 44 - Moduli of Elliptic Curves
- Lecture 45 - Punctured Complex Tori are Elliptic Algebraic Affine Plane Cubic Curves in Complex 2-Space
- Lecture 46 - The Natural Riemann Surface Structure on an Algebraic Affine Nonsingular Plane Curve
- Lecture 47 - Complex Projective 2-Space as a Compact Complex Manifold of Dimension Two
- Lecture 48 - Complex Tori are the same as Elliptic Algebraic Projective Curves

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NPTEL Video Course - Mathematics - Linear Algebra

Subject Co-ordinator - Dr. K.C. Sivakumar

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to the Course Contents

Lecture 2 - Linear Equations

Lecture 3a - Equivalent Systems of Linear Equations I

Lecture 3b - Equivalent Systems of Linear Equations II

Lecture 4 - Row-reduced Echelon Matrices

Lecture 5 - Row-reduced Echelon Matrices and Non-homogeneous Equations

Lecture 6 - Elementary Matrices, Homogeneous Equations and Non-homogeneous Equations

Lecture 7 - Invertible matrices, Homogeneous Equations Non-homogeneous Equations

Lecture 8 - Vector spaces

Lecture 9 - Elementary Properties in Vector Spaces. Subspaces

Lecture 10 - Subspaces (Continued...), Spanning Sets, Linear Independence, Dependence

Lecture 11 - Basis for a vector space

Lecture 12 - Dimension of a vector space

Lecture 13 - Dimensions of Sums of Subspaces

Lecture 14 - Linear Transformations

Lecture 15 - The Null Space and the Range Space of a Linear Transformation

Lecture 16 - The Rank-Nullity-Dimension Theorem. Isomorphisms Between Vector Spaces

Lecture 17 - Isomorphic Vector Spaces, Equality of the Row-rank and the Column-rank - I

Lecture 18 - Equality of the Row-rank and the Column-rank - II

Lecture 19 - The Matrix of a Linear Transformation

Lecture 20 - Matrix for the Composition and the Inverse. Similarity Transformation

Lecture 21 - Linear Functionals. The Dual Space. Dual Basis - I

Lecture 22 - Dual Basis II. Subspace Annihilators - I

Lecture 23 - Subspace Annihilators - II

Lecture 24 - The Double Dual. The Double Annihilator

Lecture 25 - The Transpose of a Linear Transformation. Matrices of a Linear Transformation and its Transpose

Lecture 26 - Eigenvalues and Eigenvectors of Linear Operators

Lecture 27 - Diagonalization of Linear Operators. A Characterization

Lecture 28 - The Minimal Polynomial

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- Lecture 29 - The Cayley-Hamilton Theorem
- Lecture 30 - Invariant Subspaces
- Lecture 31 - Triangulability, Diagonalization in Terms of the Minimal Polynomial
- Lecture 32 - Independent Subspaces and Projection Operators
- Lecture 33 - Direct Sum Decompositions and Projection Operators - I
- Lecture 34 - Direct Sum Decompositions and Projection Operators - II
- Lecture 35 - The Primary Decomposition Theorem and Jordan Decomposition
- Lecture 36 - Cyclic Subspaces and Annihilators
- Lecture 37 - The Cyclic Decomposition Theorem - I
- Lecture 38 - The Cyclic Decomposition Theorem - II. The Rational Form
- Lecture 39 - Inner Product Spaces
- Lecture 40 - Norms on Vector spaces. The Gram-Schmidt Procedure I
- Lecture 41 - The Gram-Schmidt Procedure II. The QR Decomposition
- Lecture 42 - Bessel's Inequality, Parseval's Identity, Best Approximation
- Lecture 43 - Best Approximation
- Lecture 44 - Orthogonal Complementary Subspaces, Orthogonal Projections
- Lecture 45 - Projection Theorem. Linear Functionals
- Lecture 46 - The Adjoint Operator
- Lecture 47 - Properties of the Adjoint Operation. Inner Product Space Isomorphism
- Lecture 48 - Unitary Operators
- Lecture 49 - Unitary operators - II. Self-Adjoint Operators - I.
- Lecture 50 - Self-Adjoint Operators - II - Spectral Theorem
- Lecture 51 - Normal Operators - Spectral Theorem

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

NPTEL Video Course - Mathematics - Mathematical Logic

Subject Co-ordinator - Prof. Arindama Singh

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Sets and Strings
- Lecture 2 - Syntax of Propositional Logic
- Lecture 3 - Unique Parsing
- Lecture 4 - Semantics of PL
- Lecture 5 - Consequences and Equivalences
- Lecture 6 - Five results about PL
- Lecture 7 - Calculations and Informal Proofs
- Lecture 8 - More Informal Proofs
- Lecture 9 - Normal forms
- Lecture 10 - SAT and 3SAT
- Lecture 11 - Horn-SAT and Resolution
- Lecture 12 - Resolution
- Lecture 13 - Adequacy of Resolution
- Lecture 14 - Adequacy and Resolution Strategies
- Lecture 15 - Propositional Calculus (PC)
- Lecture 16 - Some Results about PC
- Lecture 17 - Arguing with Proofs
- Lecture 18 - Adequacy of PC
- Lecture 19 - Compactness & Analytic Tableau
- Lecture 20 - Examples of Tableau Proofs
- Lecture 21 - Adequacy of Tableaux
- Lecture 22 - Syntax of First order Logic (FL)
- Lecture 23 - Symbolization & Scope of Quantifiers
- Lecture 24 - Hurdles in giving Meaning
- Lecture 25 - Semantics of FL
- Lecture 26 - Relevance Lemma
- Lecture 27 - Validity, Satisfiability & Equivalence
- Lecture 28 - Six Results about FL
- Lecture 29 - Laws, Calculation & Informal Proof

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- Lecture 30 - Quantifier Laws and Consequences
- Lecture 31 - More Proofs and Prenex Form
- Lecture 32 - Prenex Form Conversion
- Lecture 33 - Skolem Form
- Lecture 34 - Syntactic Interpretation
- Lecture 35 - Herbrand's Theorem
- Lecture 36 - Most General Unifiers
- Lecture 37 - Resolution Rules
- Lecture 38 - Resolution Examples
- Lecture 39 - Ariomatic System FC
- Lecture 40 - FC and Semidecidability of FL
- Lecture 41 - Analytic Tableau for FL
- Lecture 42 - Godels Incompleteness Theorems

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NPTEL Video Course - Mathematics - Real Analysis

Subject Co-ordinator - Prof. S.H. Kulkarni

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction

Lecture 2 - Functions and Relations

Lecture 3 - Finite and Infinite Sets

Lecture 4 - Countable Sets

Lecture 5 - Uncountable Sets, Cardinal Number

Lecture 6 - Real Number System

Lecture 7 - LUB Axiom

Lecture 8 - Sequences of Real Numbers

Lecture 9 - Sequences of Real Numbers - (Continued.)

Lecture 10 - Sequences of Real Numbers - (Continued.)

Lecture 11 - Infinite Series of Real Numbers

Lecture 12 - Series of nonnegative Real Numbers

Lecture 13 - Conditional Convergence

Lecture 14 - Metric Spaces

Lecture 15 - Metric Spaces

Lecture 16 - Balls and Spheres

Lecture 17 - Open Sets

Lecture 18 - Closure Points, Limit Points and isolated Points

Lecture 19 - Closed sets

Lecture 20 - Sequences in Metric Spaces

Lecture 21 - Completeness

Lecture 22 - Baire Category Theorem

Lecture 23 - Limit and Continuity of a Function defined on a Metric space

Lecture 24 - Continuous Functions on a Metric Space

Lecture 25 - Uniform Continuity

Lecture 26 - Connectedness

Lecture 27 - Connected Sets

Lecture 28 - Compactness

Lecture 29 - Compactness (Continued.)

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

- Lecture 30 - Characterizations of Compact Sets
- Lecture 31 - Continuous Functions on Compact Sets
- Lecture 32 - Types of Discontinuity
- Lecture 33 - Differentiation
- Lecture 34 - Mean Value Theorems
- Lecture 35 - Mean Value Theorems (Continued.)
- Lecture 36 - Taylor's Theorem
- Lecture 37 - Differentiation of Vector Valued Functions
- Lecture 38 - Integration
- Lecture 39 - Integrability
- Lecture 40 - Integrable Functions
- Lecture 41 - Integrable Functions (Continued.)
- Lecture 42 - Integration as a Limit of Sum
- Lecture 43 - Integration and Differentiation
- Lecture 44 - Integration of Vector Valued Functions
- Lecture 45 - More Theorems on Integrals
- Lecture 46 - Sequences and Series of Functions
- Lecture 47 - Uniform Convergence
- Lecture 48 - Uniform Convergence and Integration
- Lecture 49 - Uniform Convergence and Differentiation
- Lecture 50 - Construction of Everywhere Continuous Nowhere Differentiable Function
- Lecture 51 - Approximation of a Continuous Function by Polynomials
- Lecture 52 - Equicontinuous family of Functions

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

NPTEL Video Course - Mathematics - Dynamic Data Assimilation: An Introduction

Subject Co-ordinator - Prof. S. Lakshmivarahan

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - An Overview
- Lecture 2 - Data Mining, Data assimilation and prediction
- Lecture 3 - A classification of forecast errors
- Lecture 4 - Finite Dimensional Vector Space
- Lecture 5 - Matrices
- Lecture 6 - Matrices (Continued...)
- Lecture 7 - Multi-variate Calculus
- Lecture 8 - Optimization in Finite Dimensional Vector spaces
- Lecture 9 - Deterministic, Static, linear Inverse (well-posed) Problems
- Lecture 10 - Deterministic, Static, Linear Inverse (Ill-posed) Problems
- Lecture 11 - A Geometric View \hat{A} Projections
- Lecture 12 - Deterministic, Static, nonlinear Inverse Problems
- Lecture 13 - On-line Least Squares
- Lecture 14 - Examples of static inverse problems
- Lecture 15 - Interlude and a Way Forward
- Lecture 16 - Matrix Decomposition Algorithms
- Lecture 17 - Matrix Decomposition Algorithms (Continued...)
- Lecture 18 - Minimization algorithms
- Lecture 19 - Minimization algorithms (Continued...)
- Lecture 20 - Inverse problems in deterministic
- Lecture 21 - Inverse problems in deterministic (Continued...)
- Lecture 22 - Forward sensitivity method
- Lecture 23 - Relation between FSM and 4DVAR
- Lecture 24 - Statistical Estimation
- Lecture 25 - Statistical Least Squares
- Lecture 26 - Maximum Likelihood Method
- Lecture 27 - Bayesian Estimation
- Lecture 28 - From Gauss to Kalman-Linear Minimum Variance Estimation
- Lecture 29 - Initialization Classical Method

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

- Lecture 30 - Optimal interpolations
- Lecture 31 - A Bayesian Formation-3D-VAR methods
- Lecture 32 - Linear Stochastic Dynamics - Kalman Filter
- Lecture 33 - Linear Stochastic Dynamics - Kalman Filter (Continued...)
- Lecture 34 - Linear Stochastic Dynamics - Kalman Filter (Continued...)
- Lecture 35 - Covariance Square Root Filter
- Lecture 36 - Nonlinear Filtering
- Lecture 37 - Ensemble Reduced Rank Filter
- Lecture 38 - Basic nudging methods
- Lecture 39 - Deterministic predictability
- Lecture 40 - Predictability A stochastic view and Summary

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

NPTEL Video Course - Mathematics - NOC:An Invitation to Mathematics

Subject Co-ordinator - Prof. Sankaran Vishwanath

Co-ordinating Institute - Institute of Mathematical Sciences

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

- Lecture 1 - Introduction
- Lecture 2 - Long division
- Lecture 3 - Applications of Long division
- Lecture 4 - Lagrange interpolation
- Lecture 5 - The 0-1 idea in other contexts - dot and cross product
- Lecture 6 - Taylors formula
- Lecture 7 - The Chebyshev polynomials
- Lecture 8 - Counting number of monomials - several variables
- Lecture 9 - Permutations, combinations and the binomial theorem
- Lecture 10 - Combinations with repetition, and counting monomials
- Lecture 11 - Combinations with restrictions, recurrence relations
- Lecture 12 - Fibonacci numbers; an identity and a bijective proof
- Lecture 13 - Permutations and cycle type
- Lecture 14 - The sign of a permutation, composition of permutations
- Lecture 15 - Rules for drawing tangle diagrams
- Lecture 16 - Signs and cycle decompositions
- Lecture 17 - Sorting lists of numbers, and crossings in tangle diagrams
- Lecture 18 - Real and integer valued polynomials
- Lecture 19 - Integer valued polynomials revisited
- Lecture 20 - Functions on the real line, continuity
- Lecture 21 - The intermediate value property
- Lecture 22 - Visualizing functions
- Lecture 23 - Functions on the plane, Rigid motions
- Lecture 24 - More examples of functions on the plane, dilations
- Lecture 25 - Composition of functions
- Lecture 26 - Affine and Linear transformations
- Lecture 27 - Length and Area dilation, the derivative
- Lecture 28 - Examples-I
- Lecture 29 - Examples-II

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

- Lecture 30 - Linear equations, Lagrange interpolation revisited
- Lecture 31 - Completed Matrices in combinatorics
- Lecture 32 - Polynomials acting on matrices
- Lecture 33 - Divisibility, prime numbers
- Lecture 34 - Congruences, Modular arithmetic
- Lecture 35 - The Chinese remainder theorem
- Lecture 36 - The Euclidean algorithm, the 0-1 idea and the Chinese remainder theorem

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

NPTEL Video Course - Mathematics - Advanced Complex Analysis

Subject Co-ordinator - Dr. T.E. Venkata Balaji

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Fundamental Theorems Connected with Zeros of Analytic Functions
- Lecture 2 - The Argument (Counting) Principle, Rouché's Theorem and The Fundamental Theorem of Algebra
- Lecture 3 - Morera's Theorem and Normal Limits of Analytic Functions
- Lecture 4 - Hurwitz's Theorem and Normal Limits of Univalent Functions
- Lecture 5 - Local Constancy of Multiplicities of Assumed Values
- Lecture 6 - The Open Mapping Theorem
- Lecture 7 - Introduction to the Inverse Function Theorem
- Lecture 8 - Completion of the Proof of the Inverse Function Theorem
- Lecture 9 - Univalent Analytic Functions have never-zero Derivatives and are Analytic Isomorphisms
- Lecture 10 - Introduction to the Implicit Function Theorem
- Lecture 11 - Proof of the Implicit Function Theorem
- Lecture 12 - Proof of the Implicit Function Theorem
- Lecture 13 - Doing Complex Analysis on a Real Surface
- Lecture 14 - $F(z,w)=0$ is naturally a Riemann Surface
- Lecture 15 - Constructing the Riemann Surface for the Complex Logarithm
- Lecture 16 - Constructing the Riemann Surface for the m -th root function
- Lecture 17 - The Riemann Surface for the functional inverse of an analytic mapping at a critical point
- Lecture 18 - The Algebraic nature of the functional inverses of an analytic mapping at a critical point
- Lecture 19 - The Idea of a Direct Analytic Continuation or an Analytic Extension
- Lecture 20 - General or Indirect Analytic Continuation and the Lipschitz Nature of the Radius of Convergence
- Lecture 21 - Analytic Continuation Along Paths via Power Series Part A
- Lecture 22 - Analytic Continuation Along Paths via Power Series Part B
- Lecture 23 - Continuity of Coefficients occurring in Families of Power Series defining Analytic Continuations
- Lecture 24 - Analytic Continuability along Paths
- Lecture 25 - Maximal Domains of Direct and Indirect Analytic Continuation
- Lecture 26 - Deducing the Second (Simply Connected) Version of the Monodromy Theorem from the First (Homotopy)
- Lecture 27 - Existence and Uniqueness of Analytic Continuations on Nearby Paths
- Lecture 28 - Proof of the First (Homotopy) Version of the Monodromy Theorem
- Lecture 29 - Proof of the Algebraic Nature of Analytic Branches of the Functional Inverse of an Analytic Function

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

- Lecture 30 - The Mean-Value Property, Harmonic Functions and the Maximum Principle
- Lecture 31 - Proofs of Maximum Principles and Introduction to Schwarz Lemma
- Lecture 32 - Proof of Schwarz Lemma and Uniqueness of Riemann Mappings
- Lecture 33 - Reducing Existence of Riemann Mappings to Hyperbolic Geometry of Sub-domains of the Unit Disc
- Lecture 34 - Differential or Infinitesimal Schwarz Lemma, Picks Lemma, Hyperbolic Arclengths, Metric and Geodesics
- Lecture 35 - Differential or Infinitesimal Schwarz Lemma, Picks Lemma, Hyperbolic Arclengths, Metric and Geodesics
- Lecture 36 - Hyperbolic Geodesics for the Hyperbolic Metric on the Unit Disc
- Lecture 37 - Schwarz-Pick Lemma for the Hyperbolic Metric on the Unit Disc
- Lecture 38 - Arzela-Ascoli Theorem
- Lecture 39 - Completion of the Proof of the Arzela-Ascoli Theorem and Introduction to Montels Theorem
- Lecture 40 - The Proof of Montels Theorem
- Lecture 41 - The Candidate for a Riemann Mapping
- Lecture 42 - Completion of Proof of The Riemann Mapping Theorem
- Lecture 43 - Completion of Proof of The Riemann Mapping Theorem

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

NPTEL Video Course - Mathematics - NOC:Discrete Mathematics

Subject Co-ordinator - Prof. Sourav Chakraborty

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Course Introduction
- Lecture 2 - Sets, Relations and Functions
- Lecture 3 - Propositional Logic and Predicate Logic
- Lecture 4 - Propositional Logic and Predicate Logic (Part 2)
- Lecture 5 - Elementary Number Theory
- Lecture 6 - Formal Proofs
- Lecture 7 - Direct Proofs
- Lecture 8 - Case Study
- Lecture 9 - Case Study (Part 2)
- Lecture 10 - Sets, Relations, Function and Logic
- Lecture 11 - Proof by Contradiction (Part 1)
- Lecture 12 - Proof by Contradiction (Part 2)
- Lecture 13 - Proof by Contraposition
- Lecture 14 - Proof by Counter Example
- Lecture 15 - Mathematical Induction (Part 1)
- Lecture 16 - Mathematical Induction (Part 2)
- Lecture 17 - Mathematical Induction (Part 3)
- Lecture 18 - Mathematical Induction (Part 4)
- Lecture 19 - Mathematical Induction (Part 5)
- Lecture 20 - Mathematical Induction (Part 6)
- Lecture 21 - Mathematical Induction (Part 7)
- Lecture 22 - Mathematical Induction (Part 8)
- Lecture 23 - Introduction to Graph Theory
- Lecture 24 - Handshake Problem
- Lecture 25 - Tournament Problem
- Lecture 26 - Tournament Problem (Part 2)
- Lecture 27 - Ramsey Problem
- Lecture 28 - Ramsey Problem (Part 2)
- Lecture 29 - Properties of Graphs

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- Lecture 30 - Problem 1
- Lecture 31 - Problem 2
- Lecture 32 - Problem 3 & 4
- Lecture 33 - Counting for Selection
- Lecture 34 - Counting for Distribution
- Lecture 35 - Counting for Distribution (Part 2)
- Lecture 36 - Some Counting Problems
- Lecture 37 - Counting using Recurrence Relations
- Lecture 38 - Counting using Recurrence Relations (Part 2)
- Lecture 39 - Solving Recurrence Relations (Part 1)
- Lecture 40 - Solving Recurrence Relations (Part 2)
- Lecture 41 - Asymptotic Relations (Part 1)
- Lecture 42 - Asymptotic Relations (Part 2)
- Lecture 43 - Asymptotic Relations (Part 3)
- Lecture 44 - Asymptotic Relations (Part 4)
- Lecture 45 - Generating Functions (Part 1)
- Lecture 46 - Generating Functions (Part 2)
- Lecture 47 - Generating Functions (Part 3)
- Lecture 48 - Generating Functions (Part 4)
- Lecture 49 - Proof Techniques
- Lecture 50 - Modeling
- Lecture 51 - Combinatorics

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

NPTEL Video Course - Mathematics - Advanced Complex Analysis - Part 2

Subject Co-ordinator - Dr. T.E. Venkata Balaji

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Properties of the Image of an Analytic Function - Introduction to the Picard Theorems
- Lecture 2 - Recalling Singularities of Analytic Functions - Non-isolated and Isolated Removable, Pole and Essential
- Lecture 3 - Recalling Riemann's Theorem on Removable Singularities
- Lecture 4 - Casorati-Weierstrass Theorem; Dealing with the Point at Infinity -- Riemann Sphere and Riemann Sphere
- Lecture 5 - Neighborhood of Infinity, Limit at Infinity and Infinity as an Isolated Singularity
- Lecture 6 - Studying Infinity - Formulating Epsilon-Delta Definitions for Infinite Limits and Limits at Infinity
- Lecture 7 - When is a function analytic at infinity ?
- Lecture 8 - Laurent Expansion at Infinity and Riemann's Removable Singularities Theorem for the Point at Infinity
- Lecture 9 - The Generalized Liouville Theorem - Little Brother of Little Picard and Analogue of Casorati-Weierstrass
- Lecture 10 - Morera's Theorem at Infinity, Infinity as a Pole and Behaviour at Infinity of Rational and Meromorphic
- Lecture 11 - Residue at Infinity and Introduction to the Residue Theorem for the Extended Complex Plane - Residue
- Lecture 12 - Proofs of Two Avatars of the Residue Theorem for the Extended Complex Plane and Applications of
- Lecture 13 - Infinity as an Essential Singularity and Transcendental Entire Functions
- Lecture 14 - Meromorphic Functions on the Extended Complex Plane are Precisely Quotients of Polynomials
- Lecture 15 - The Ubiquity of Meromorphic Functions - The Nerves of the Geometric Network Bridging Algebra, Analysis
- Lecture 16 - Continuity of Meromorphic Functions at Poles and Topologies of Spaces of Functions
- Lecture 17 - Why Normal Convergence, but Not Globally Uniform Convergence, is the Inevitable in Complex Analysis
- Lecture 18 - Measuring Distances to Infinity, the Function Infinity and Normal Convergence of Holomorphic Functions
- Lecture 19 - The Invariance Under Inversion of the Spherical Metric on the Extended Complex Plane
- Lecture 20 - Introduction to Hurwitz's Theorem for Normal Convergence of Holomorphic Functions in the Spherical
- Lecture 21 - Completion of Proof of Hurwitz's Theorem for Normal Limits of Analytic Functions in the Spherical
- Lecture 22 - Hurwitz's Theorem for Normal Limits of Meromorphic Functions in the Spherical Metric
- Lecture 23 - What could the Derivative of a Meromorphic Function Relative to the Spherical Metric Possibly Be
- Lecture 24 - Defining the Spherical Derivative of a Meromorphic Function
- Lecture 25 - Well-definedness of the Spherical Derivative of a Meromorphic Function at a Pole and Inversion-in
- Lecture 26 - Topological Preliminaries - Translating Compactness into Boundedness
- Lecture 27 - Introduction to the Arzela-Ascoli Theorem - Passing from abstract Compactness to verifiable Equi
- Lecture 28 - Proof of the Arzela-Ascoli Theorem for Functions - Abstract Compactness Implies Equicontinuity
- Lecture 29 - Proof of the Arzela-Ascoli Theorem for Functions - Equicontinuity Implies Compactness

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- Lecture 30 - Introduction to the Montel Theorem - the Holomorphic Avatar of the Arzela-Ascoli Theorem & Why
- Lecture 31 - Completion of Proof of the Montel Theorem - the Holomorphic Avatar of the Arzela-Ascoli Theorem
- Lecture 32 - Introduction to Marty's Theorem - the Meromorphic Avatar of the Montel & Arzela-Ascoli Theorems
- Lecture 33 - Proof of one direction of Marty's Theorem - the Meromorphic Avatar of the Montel & Arzela-Ascoli
- Lecture 34 - Proof of the other direction of Marty's Theorem - the Meromorphic Avatar of the Montel & Arzela
- Lecture 35 - Normal Convergence at Infinity and Hurwitz's Theorems for Normal Limits of Analytic and Meromorphic
- Lecture 36 - Normal Sequential Compactness, Normal Uniform Boundedness and Montel's & Marty's Theorems at Infinity
- Lecture 37 - Local Analysis of Normality and the Zooming Process - Motivation for Zalcman's Lemma
- Lecture 38 - Characterizing Normality at a Point by the Zooming Process and the Motivation for Zalcman's Lemma
- Lecture 39 - Local Analysis of Normality and the Zooming Process - Motivation for Zalcman's Lemma
- Lecture 40 - Montel's Deep Theorem - The Fundamental Criterion for Normality or Fundamental Normality Test
- Lecture 41 - Proofs of the Great and Little Picard Theorems
- Lecture 42 - Royden's Theorem on Normality Based On Growth Of Derivatives
- Lecture 43 - Schottky's Theorem - Uniform Boundedness from a Point to a Neighbourhood & Problem Solving Sessions

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

NPTEL Video Course - Mathematics - Basic Algebraic Geometry : Varieties, Morphisms, Local Rings, Function Fields

Subject Co-ordinator - Dr. T.E. Venkata Balaji

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - What is Algebraic Geometry?
- Lecture 2 - The Zariski Topology and Affine Space
- Lecture 3 - Going back and forth between subsets and ideals
- Lecture 4 - Irreducibility in the Zariski Topology
- Lecture 5 - Irreducible Closed Subsets Correspond to Ideals Whose Radicals are Prime
- Lecture 6 - Understanding the Zariski Topology on the Affine Line; The Noetherian property in Topology and in Algebra
- Lecture 7 - Basic Algebraic Geometry
- Lecture 8 - Topological Dimension, Krull Dimension and Heights of Prime Ideals
- Lecture 9 - The Ring of Polynomial Functions on an Affine Variety
- Lecture 10 - Geometric Hypersurfaces are Precisely Algebraic Hypersurfaces
- Lecture 11 - Why Should We Study Affine Coordinate Rings of Functions on Affine Varieties ?
- Lecture 12 - Capturing an Affine Variety Topologically From the Maximal Spectrum of its Ring of Functions
- Lecture 13 - Analyzing Open Sets and Basic Open Sets for the Zariski Topology
- Lecture 14 - The Ring of Functions on a Basic Open Set in the Zariski Topology
- Lecture 15 - Quasi-Compactness in the Zariski Topology; Regularity of a Function at a point of an Affine Variety
- Lecture 16 - What is a Global Regular Function on a Quasi-Affine Variety?
- Lecture 17 - Characterizing Affine Varieties; Defining Morphisms between Affine or Quasi-Affine Varieties
- Lecture 18 - Translating Morphisms into Affines as k -Algebra maps and the Grand Hilbert Nullstellensatz
- Lecture 19 - Morphisms into an Affine Correspond to k -Algebra Homomorphisms from its Coordinate Ring of Functions
- Lecture 20 - The Coordinate Ring of an Affine Variety Determines the Affine Variety and is Intrinsic to it
- Lecture 21 - Automorphisms of Affine Spaces and of Polynomial Rings - The Jacobian Conjecture; The Punctured Affine Plane
- Lecture 22 - The Various Avatars of Projective n -space
- Lecture 23 - Gluing $(n+1)$ copies of Affine n -Space to Produce Projective n -space in Topology, Manifold Theory and Algebra
- Lecture 24 - Translating Projective Geometry into Graded Rings and Homogeneous Ideals
- Lecture 25 - Expanding the Category of Varieties to Include Projective and Quasi-Projective Varieties
- Lecture 26 - Translating Homogeneous Localisation into Geometry and Back
- Lecture 27 - Adding a Variable is Undone by Homogenous Localization - What is the Geometric Significance of this?
- Lecture 28 - Doing Calculus Without Limits in Geometry ?
- Lecture 29 - The Birth of Local Rings in Geometry and in Algebra

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- Lecture 30 - The Formula for the Local Ring at a Point of a Projective Variety Or Playing with Localisations
- Lecture 31 - The Field of Rational Functions or Function Field of a Variety - The Local Ring at the Generic Point
- Lecture 32 - Fields of Rational Functions or Function Fields of Affine and Projective Varieties and their Relationship
- Lecture 33 - Global Regular Functions on Projective Varieties are Simply the Constants
- Lecture 34 - The d-Uple Embedding and the Non-Intrinsic Nature of the Homogeneous Coordinate Ring of a Projective Variety
- Lecture 35 - The Importance of Local Rings - A Morphism is an Isomorphism if it is a Homeomorphism and Induces an Isomorphism of Local Rings
- Lecture 36 - The Importance of Local Rings - A Rational Function in Every Local Ring is Globally Regular
- Lecture 37 - Geometric Meaning of Isomorphism of Local Rings - Local Rings are Almost Global
- Lecture 38 - Local Ring Isomorphism, Equals Function Field Isomorphism, Equals Birationality
- Lecture 39 - Why Local Rings Provide Calculus Without Limits for Algebraic Geometry Pun Intended!
- Lecture 40 - How Local Rings Detect Smoothness or Nonsingularity in Algebraic Geometry
- Lecture 41 - Any Variety is a Smooth Manifold with or without Non-Smooth Boundary
- Lecture 42 - Any Variety is a Smooth Hypersurface On an Open Dense Subset

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

NPTEL Video Course - Mathematics - NOC:Introduction to Commutative Algebra

Subject Co-ordinator - Prof. A.V.Jayanthan

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Review of Ring Theory
- Lecture 2 - Review of Ring Theory (Continued...)
- Lecture 3 - Ideals in commutative rings
- Lecture 4 - Operations on ideals
- Lecture 5 - Properties of prime ideals
- Lecture 6 - Colon and Radical of ideals
- Lecture 7 - Radicals, extension and contraction of ideals
- Lecture 8 - Modules and homomorphisms
- Lecture 9 - Isomorphism theorems and Operations on modules
- Lecture 10 - Operations on modules (Continued...)
- Lecture 11 - Module homomorphism and determinant trick
- Lecture 12 - Nakayama's lemma and exact sequences
- Lecture 13 - Exact sequences (Continued...)
- Lecture 14 - Homomorphisms and Tensor products
- Lecture 15 - Properties of tensor products
- Lecture 16 - Properties of tensor products (Continued...)
- Lecture 17 - Tensor product of Algebras
- Lecture 18 - Localization
- Lecture 19 - Localization (Continued...)
- Lecture 20 - Local properties
- Lecture 21 - Further properties of localization
- Lecture 22 - Integral dependence
- Lecture 23 - Integral extensions
- Lecture 24 - Lying over and Going-up theorems
- Lecture 25 - Going-down theorem
- Lecture 26 - Going-down theorem (Continued...)
- Lecture 27 - Chain conditions
- Lecture 28 - Noetherian and Artinian modules
- Lecture 29 - Properties of Noetherian and Artinian modules, Composition Series

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- Lecture 30 - Further properties of Noetherian and Artinian modules and rings
- Lecture 31 - Hilbert basis theorem and Primary decomposition
- Lecture 32 - Primary decomposition (Continued...)
- Lecture 33 - Uniqueness of primary decomposition
- Lecture 34 - 2nd Uniqueness theorem, Artinian rings
- Lecture 35 - Properties of Artinian rings
- Lecture 36 - Structure Theorem of Artinian rings
- Lecture 37 - Noether Normalization
- Lecture 38 - Hilberts Nullstellensatz

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NPTEL Video Course - Mathematics - NOC:Differential Equations

Subject Co-ordinator - Prof. Srinivasa Manam

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to Ordinary Differential Equations (ODE)
- Lecture 2 - Methods for First Order ODE's - Homogeneous Equations
- Lecture 3 - Methods for First order ODE's - Exact Equations
- Lecture 4 - Methods for First Order ODE's - Exact Equations (Continued...)
- Lecture 5 - Methods for First order ODE's - Reducible to Exact Equations
- Lecture 6 - Methods for First order ODE's - Reducible to Exact Equations (Continued...)
- Lecture 7 - Non-Exact Equations - Finding Integrating Factors
- Lecture 8 - Linear First Order ODE and Bernoulli's Equation
- Lecture 9 - Introduction to Second order ODE's
- Lecture 10 - Properties of solutions of second order homogeneous ODE's
- Lecture 11 - Abel's formula to find the other solution
- Lecture 12 - Abel's formula - Demonstration
- Lecture 13 - Second Order ODE's with constant coefficients
- Lecture 14 - Euler - Cauchy equation
- Lecture 15 - Non homogeneous ODEs Variation of Parameters
- Lecture 16 - Method of undetermined coefficients
- Lecture 17 - Demonstration of Method of undetermined coefficients
- Lecture 18 - Power Series and its properties
- Lecture 19 - Power Series Solutions to Second Order ODE's
- Lecture 20 - Power Series Solutions (Continued...)
- Lecture 21 - Legendre Differential Equation
- Lecture 22 - Legendre Polynomials
- Lecture 23 - Properties of Legendre Polynomials
- Lecture 24 - Power series solutions around a regular singular point
- Lecture 25 - Frobenius method of solutions
- Lecture 26 - Frobenius method of solutions (Continued...)
- Lecture 27 - Examples on Frobenius method
- Lecture 28 - Bessel differential equation
- Lecture 29 - Frobenius solutions for Bessel Equation

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- Lecture 30 - Properties of Bessel functions
- Lecture 31 - Properties of Bessel functions (Continued...)
- Lecture 32 - Introduction to Sturm-Liouville theory
- Lecture 33 - Sturm-Liouville Problems
- Lecture 34 - Regular Sturm-Liouville problem
- Lecture 35 - Periodic and singular Sturm-Liouville Problems
- Lecture 36 - Generalized Fourier series
- Lecture 37 - Examples of Sturm-Liouville systems
- Lecture 38 - Examples of Sturm-Liouville systems (Continued...)
- Lecture 39 - Examples of regular Sturm-Liouville systems
- Lecture 40 - Second order linear PDEs
- Lecture 41 - Classification of second order linear PDEs
- Lecture 42 - Reduction to canonical form for equations with constant coefficients
- Lecture 43 - Reduction to canonical form for equations with variable coefficients
- Lecture 44 - Reduction to Normal form-More examples
- Lecture 45 - D'Alembert solution for wave equation
- Lecture 46 - Uniqueness of solutions for wave equation
- Lecture 47 - Vibration of a semi-infinite string
- Lecture 48 - Vibration of a finite string
- Lecture 49 - Finite length string vibrations
- Lecture 50 - Finite length string vibrations (Continued...)
- Lecture 51 - Non-homogeneous wave equation
- Lecture 52 - Vibration of a circular drum
- Lecture 53 - Solutions of heat equation-Properties
- Lecture 54 - Temperature in an infinite rod
- Lecture 55 - Temperature in a semi-infinite rod
- Lecture 56 - Non-homogeneous heat equation
- Lecture 57 - Temperature in a finite rod
- Lecture 58 - Temperature in a finite rod with insulated ends
- Lecture 59 - Laplace equation over a rectangle
- Lecture 60 - Laplace equation over a rectangle with flux boundary conditions
- Lecture 61 - Laplace equation over circular domains
- Lecture 62 - Laplace equation over circular Sectors
- Lecture 63 - Uniqueness of the boundary value problems for Laplace equation
- Lecture 64 - Conclusions

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NPTEL Video Course - Mathematics - NOC:Numerical Analysis

Subject Co-ordinator - Prof. R. Usha

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Lesson 1 - Introduction, Motivation
Lecture 2 - Lesson 2 - Part 1 - Mathematical Preliminaries, Polynomial Interpolation - 1
Lecture 3 - Lesson 2 - Part 2 - Mathematical Preliminaries, Polynomial Interpolation - 1
Lecture 4 - Lesson 3 - Part 1 - Polynomial Interpolation - 2
Lecture 5 - Lesson 3 - Part 2 - Polynomial Interpolation - 2
Lecture 6 - Lesson 4 - Polynomial Interpolation - 3
Lecture 7 - Lagrange Interpolation Polynomial, Error In Interpolation - 1
Lecture 8 - Lagrange Interpolation Polynomial, Error In Interpolation - 1
Lecture 9 - Error In Interpolation - 2
Lecture 10 - Error In Interpolation - 2
Lecture 11 - Divide Difference Interpolation Polynomial
Lecture 12 - Properties Of Divided Difference, Introduction To Inverse Interpolation
Lecture 13 - Properties Of Divided Difference, Introduction To Inverse Interpolation
Lecture 14 - Inverse Interpolation, Remarks on Polynomial Interpolation
Lecture 15 - Numerical Differentiation - 1 Taylor Series Method
Lecture 16 - Numerical Differentiation - 2 Method Of Undetermined Coefficients
Lecture 17 - Numerical Differentiation - 2 Polynomial Interpolation Method
Lecture 18 - Numerical Differentiation - 3 Operator Method Numerical Integration - 1
Lecture 19 - Numerical Integration - 2 Error in Trapezoidal Rule Simpson's Rule
Lecture 20 - Numerical Integration - 3 Error in Simpson's Rule Composite in Trapezoidal Rule, Error
Lecture 21 - Numerical Integration - 4 Composite Simpsons Rule , Error Method of Undetermined Coefficients
Lecture 22 - Numerical Integration - 5 Gaussian Quadrature (Two-Point Method)
Lecture 23 - Numerical Integrature - 5 Gaussian Quadrature (Three-Point Method) Adaptive Quadrature
Lecture 24 - Numerical Solution of Ordinary Differential Equation (ODE) - 1
Lecture 25 - Numerical Solution Of ODE-2 Stability , Single-Step Methods - 1 Taylor Series Method
Lecture 26 - Numerical Solution Of ODE-3 Examples of Taylor Series Method Euler's Method
Lecture 27 - Numerical Solution Of ODE-4 Runge-Kutta Methods
Lecture 28 - Numerical Solution Of ODE-5 Example For RK-Method Of Order 2 Modified Euler's Method
Lecture 29 - Numerical Solution Of Ordinary Differential Equations - 6 Predictor-Corrector Methods (Adam-Moul

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

- Lecture 30 - Numerical Solution Of Ordinary Differential Equations - 7
- Lecture 31 - Numerical Solution Of Ordinary Differential Equations - 8
- Lecture 32 - Numerical Solution of Ordinary Differential Equations - 9
- Lecture 33 - Numerical Solution of Ordinary Differential Equations - 10
- Lecture 34 - Numerical Solution of Ordinary Differential Equations - 11
- Lecture 35 - Root Finding Methods - 1 The Bisection Method - 1
- Lecture 36 - Root Finding Methods - 2 The Bisection Method - 2
- Lecture 37 - Root Finding Methods - 3 Newton-Raphson Method - 1
- Lecture 38 - Root Finding Methods - 4 Newton-Raphson Method - 2
- Lecture 39 - Root Finding Methods - 5 Secant Method, Method Of false Position
- Lecture 40 - Root Finding Methods - 6 Fixed Point Methods - 1
- Lecture 41 - Root Finding Methods - 7 Fixed Point Methods - 2
- Lecture 42 - Root Finding Methods - 8 Fixed Point Iteration Methods - 3
- Lecture 43 - Root Finding Methods - 9 Practice Problems
- Lecture 44 - Solution Of Linear Systems Of Equations - 1
- Lecture 45 - Solution Of Linear Systems Of Equations - 2
- Lecture 46 - Solution Of Linear Systems Of Equations - 3
- Lecture 47 - Solution Of Linear Systems Of Equations - 4
- Lecture 48 - Solution Of Linear Systems Of Equations - 5
- Lecture 49 - Solution Of Linear Systems Of Equations - 6
- Lecture 50 - Solution Of Linear Systems Of Equations - 7
- Lecture 51 - Solution Of Linear Systems Of Equations - 8 Iterative Method - 1
- Lecture 52 - Solution Of Linear Systems Of Equations - 8 Iterative Method - 2
- Lecture 53 - Matrix Eigenvalue Problems - 2 Power Method - 2
- Lecture 54 - Practice Problems

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NPTEL Video Course - Mathematics - NOC:Graph Theory

Subject Co-ordinator - Dr. Soumen Maity

Co-ordinating Institute - IISER - Pune

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

Lecture 1 - Basic Concepts
Lecture 2 - Basic Concepts - 1
Lecture 3 - Eulerian and Hamiltonian Graph
Lecture 4 - Eulerian and Hamiltonian Graph - 1
Lecture 5 - Bipartite Graph
Lecture 6 - Bipartite Graph
Lecture 7 - Diameter of a graph; Isomorphic graphs
Lecture 8 - Diameter of a graph; Isomorphic graphs
Lecture 9 - Minimum Spanning Tree
Lecture 10 - Minimum Spanning Trees (Continued...)
Lecture 11 - Minimum Spanning Trees (Continued...)
Lecture 12 - Minimum Spanning Trees (Continued...)
Lecture 13 - Maximum Matching in Bipartite Graph
Lecture 14 - Maximum Matching in Bipartite Graph - 1
Lecture 15 - Hall's Theorem and Konig's Theorem
Lecture 16 - Hall's Theorem and Konig's Theorem - 1
Lecture 17 - Independent Set and Edge Cover
Lecture 18 - Independent Set and Edge Cover - 1
Lecture 19 - Matching in General Graphs
Lecture 20 - Proof of Halls Theorem
Lecture 21 - Stable Matching
Lecture 22 - Gale-Shapley Algorithm
Lecture 23 - Graph Connectivity
Lecture 24 - Graph Connectivity - 1
Lecture 25 - 2-Connected Graphs
Lecture 26 - 2-Connected Graphs - 1
Lecture 27 - Subdivision of an edge; 2-edge-connected graphs
Lecture 28 - Problems Related to Graphs Connectivity
Lecture 29 - Flow Network

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- Lecture 30 - Residual Network and Augmenting Path
- Lecture 31 - Augmenting Path Algorithm
- Lecture 32 - Max-Flow and Min-Cut
- Lecture 33 - Max-Flow and Min-Cut Theorem
- Lecture 34 - Vertex Colouring
- Lecture 35 - Chromatic Number and Max. Degree
- Lecture 36 - Edge Colouring
- Lecture 37 - Planar Graphs and Euler's Formula
- Lecture 38 - Characterization Of Planar Graphs
- Lecture 39 - Colouring of Planar Graphs

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

NPTEL Video Course - Mathematics - NOC:Transform Techniques for Engineers

Subject Co-ordinator - Prof. Srinivasa Manam

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to Fourier series

Lecture 2 - Fourier series - Examples

Lecture 3 - Complex Fourier series

Lecture 4 - Conditions for the Convergence of Fourier Series

Lecture 5 - Conditions for the Convergence of Fourier Series (Continued...)

Lecture 6 - Use of Delta function in the Fourier series convergence

Lecture 7 - More Examples on Fourier Series of a Periodic Signal

Lecture 8 - Gibb's Phenomenon in the Computation of Fourier Series

Lecture 9 - Properties of Fourier Transform of a Periodic Signal

Lecture 10 - Properties of Fourier transform (Continued...)

Lecture 11 - Parseval's Identity and Recap of Fourier series

Lecture 12 - Fourier integral theorem-an informal proof

Lecture 13 - Definition of Fourier transforms

Lecture 14 - Fourier transform of a Heavyside function

Lecture 15 - Use of Fourier transforms to evaluate some integrals

Lecture 16 - Evaluation of an integral- Recall of complex function theory

Lecture 17 - Properties of Fourier transforms of non-periodic signals

Lecture 18 - More properties of Fourier transforms

Lecture 19 - Fourier integral theorem - proof

Lecture 20 - Application of Fourier transform to ODE's

Lecture 21 - Application of Fourier transforms to differential and integral equations

Lecture 22 - Evaluation of integrals by Fourier transforms

Lecture 23 - D'Alembert's solution by Fourier transform

Lecture 24 - Solution of Heat equation by Fourier transform

Lecture 25 - Solution of Heat and Laplace equations by Fourier transform

Lecture 26 - Introduction to Laplace transform

Lecture 27 - Laplace transform of elementary functions

Lecture 28 - Properties of Laplace transforms

Lecture 29 - Properties of Laplace transforms (Continued...)

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- Lecture 30 - Methods of finding inverse Laplace transform
- Lecture 31 - Heavyside expansion theorem
- Lecture 32 - Review of complex function theory
- Lecture 33 - Inverse Laplace transform by contour integration
- Lecture 34 - Application of Laplace transforms - ODEs'
- Lecture 35 - Solutions of initial or boundary value problems for ODEs'
- Lecture 36 - Solving first order PDE's by Laplace transform
- Lecture 37 - Solution of wave equation by Laplace transform
- Lecture 38 - Solving hyperbolic equations by Laplace transform
- Lecture 39 - Solving heat equation by Laplace transform
- Lecture 40 - Initial boundary value problems for heat equations
- Lecture 41 - Solution of Integral Equations by Laplace Transform
- Lecture 42 - Evaluation of Integrals by Laplace Transform
- Lecture 43 - Introduction to Z-Transforms
- Lecture 44 - Properties of Z-Transforms
- Lecture 45 - Inverse Z-transforms
- Lecture 46 - Solution of difference equations by Z-transforms
- Lecture 47 - Evaluation of infinite sums by Z-transforms
- Lecture 48 - conclusions

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

NPTEL Video Course - Mathematics - NOC:Introduction to Probability and Statistics

Subject Co-ordinator - Prof. G. Srinivasan

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to probability and Statistics
- Lecture 2 - Types of data
- Lecture 3 - Categorical data
- Lecture 4 - Describing Categorical data
- Lecture 5 - Describing Categorical data (Continued...)
- Lecture 6 - Describing numerical data
- Lecture 7 - Describing numerical data (Continued...)
- Lecture 8 - Exercises, Association between categorical variables
- Lecture 9 - Association between categorical variables (Continued...)
- Lecture 10 - Association between numerical variables
- Lecture 11 - Association between numerical variables (Continued...)
- Lecture 12 - Probability
- Lecture 13 - Rules of Probability
- Lecture 14 - Rules of Probability (Continued...)
- Lecture 15 - Conditional Probability
- Lecture 16 - Random variables
- Lecture 17 - Random variables - concepts and exercises
- Lecture 18 - Association between Random variables
- Lecture 19 - Binomial Distribution
- Lecture 20 - Normal distribution
- Lecture 21 - Additional Examples

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NPTEL Video Course - Mathematics - NOC:Introduction to Abstract Group Theory

Subject Co-ordinator - Prof. Krishna Hanumanthu

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Motivational examples of groups
- Lecture 2 - Definition of a group and examples
- Lecture 3 - More examples of groups
- Lecture 4 - Basic properties of groups and multiplication tables
- Lecture 5 - Problems - 1
- Lecture 6 - Problems - 2
- Lecture 7 - Problems - 3
- Lecture 8 - Subgroups
- Lecture 9 - Types of groups
- Lecture 10 - Group homomorphisms and examples
- Lecture 11 - Properties of homomorphisms
- Lecture 12 - Group isomorphisms
- Lecture 13 - Normal subgroups
- Lecture 14 - Equivalence relations
- Lecture 15 - Problems - 4
- Lecture 16 - Cosets and Lagrange's theorem
- Lecture 17 - S_3 revisited
- Lecture 18 - Problems - 5
- Lecture 19 - Quotient groups
- Lecture 20 - Examples of quotient groups
- Lecture 21 - First isomorphism theorem
- Lecture 22 - Examples and Second isomorphism theorem
- Lecture 23 - Third isomorphism theorem
- Lecture 24 - Cauchy's theorem
- Lecture 25 - Problems - 6
- Lecture 26 - Symmetric groups - I
- Lecture 27 - Symmetric Groups - II
- Lecture 28 - Symmetric groups - III
- Lecture 29 - Symmetric groups - IV

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- Lecture 30 - Odd and even permutations - I
- Lecture 31 - Odd and even permutations - II
- Lecture 32 - Alternating groups
- Lecture 33 - Group actions
- Lecture 34 - Examples of group actions
- Lecture 35 - Orbits and stabilizers
- Lecture 36 - Counting formula
- Lecture 37 - Cayley's theorem
- Lecture 38 - Problems - 7
- Lecture 39 - Problems - 8 and Class equation
- Lecture 40 - Group actions on subsets
- Lecture 41 - Sylow Theorem - I
- Lecture 42 - Sylow Theorem - II
- Lecture 43 - Sylow Theorem - III
- Lecture 44 - Problems - 9
- Lecture 45 - Problems - 10

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NPTEL Video Course - Mathematics - NOC:Groups: Motion, Symmetry and Puzzles

Subject Co-ordinator - Prof. Amit Kulshrestha

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Permutation, symmetry and groups
- Lecture 2 - Groups acting on a set/an object
- Lecture 3 - More on group actions
- Lecture 4 - Groups and parity
- Lecture 5 - Parity and puzzles
- Lecture 6 - Generators and relations
- Lecture 7 - Cosets, quotients and homomorphisms
- Lecture 8 - Cayley graphs of groups
- Lecture 9 - Platonic solids
- Lecture 10 - Symmetries of plane and wallpapers
- Lecture 11 - Introduction to GAP
- Lecture 12 - GAP through Rubik's cube
- Lecture 13 - Representing abstract groups
- Lecture 14 - A quick introduction to group representations
- Lecture 15 - Rotations and quaternions
- Lecture 16 - Rotational symmetries of platonic solids
- Lecture 17 - Finite subgroups of $SO(3)$

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NPTEL Video Course - Mathematics - NOC:Introduction to Rings and Fields

Subject Co-ordinator - Prof. Krishna Hanumanthu

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction, main definitions
Lecture 2 - Examples of rings
Lecture 3 - More examples
Lecture 4 - Polynomial Rings - 1
Lecture 5 - Polynomial Rings - 2
Lecture 6 - Homomorphisms
Lecture 7 - Kernels, ideals
Lecture 8 - Problems - 1
Lecture 9 - Problems - 2
Lecture 10 - Problems - 3
Lecture 11 - Quotient Rings
Lecture 12 - First isomorphism and correspondence theorems
Lecture 13 - Examples of correspondence theorem
Lecture 14 - Prime ideals
Lecture 15 - Maximal ideals, integral domains
Lecture 16 - Existence of maximal ideals
Lecture 17 - Problems - 4
Lecture 18 - Problems - 5
Lecture 19 - Problems - 6
Lecture 20 - Field of fractions, Noetherian rings - 1
Lecture 21 - Noetherian rings - 2
Lecture 22 - Hilbert Basis Theorem
Lecture 23 - Irreducible, prime elements
Lecture 24 - Irreducible, prime elements, GCD
Lecture 25 - Principal Ideal Domains
Lecture 26 - Unique Factorization Domains - 1
Lecture 27 - Unique Factorization Domains - 2
Lecture 28 - Gauss Lemma
Lecture 29 - $\mathbb{Z}[X]$ is a UFD

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- Lecture 30 - Eisenstein criterion and Problems - 7
- Lecture 31 - Problems - 8
- Lecture 32 - Problems - 9
- Lecture 33 - Field extensions - 1
- Lecture 34 - Field extensions - 2
- Lecture 35 - Degree of a field extension - 1
- Lecture 36 - Degree of a field extension - 2
- Lecture 37 - Algebraic elements form a field
- Lecture 38 - Field homomorphisms
- Lecture 39 - Splitting fields
- Lecture 40 - Finite fields - 1
- Lecture 41 - Finite fields - 2
- Lecture 42 - Finite fields - 3
- Lecture 43 - Problems - 10
- Lecture 44 - Problems - 11

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NPTEL Video Course - Mathematics - NOC:Probabilistic Methods in PDE

Subject Co-ordinator - Prof. Anindya Goswami

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Prerequisite Measure Theory - Part 1
- Lecture 2 - Prerequisite Measure Theory - Part 2
- Lecture 3 - Prerequisite Measure Theory - Part 3
- Lecture 4 - Random variable
- Lecture 5 - Stochastic Process
- Lecture 6 - Conditional Expectation
- Lecture 7 - Preliminary for Stochastic Integration - Part 1
- Lecture 8 - Preliminary for Stochastic Integration - Part 2
- Lecture 9 - Definition and properties of Stochastic Integration - Part 1
- Lecture 10 - Definition and properties of Stochastic Integration - Part 2
- Lecture 11 - Further properties of Stochastic Integration
- Lecture 12 - Extension of stochastic integral
- Lecture 13 - change of variable formula and proof - Part 1
- Lecture 14 - change of variable formula and proof - Part 2
- Lecture 15 - Brownian motion as the building block
- Lecture 16 - Brownian motion and its martingale property - Part 1
- Lecture 17 - Brownian motion and its martingale property - Part 2
- Lecture 18 - Application of Ito's rule on Ito process
- Lecture 19 - Harmonic function and its properties
- Lecture 20 - Maximum principle of harmonic function
- Lecture 21 - Dirichlet Problem and bounded solution
- Lecture 22 - Example of a Dirichlet problem
- Lecture 23 - Regular points at the boundary
- Lecture 24 - Zarembas cone condition for regularity
- Lecture 25 - Summary of the Zaremba's cone condition
- Lecture 26 - Continuity of candidate solution at regular points - Part 1
- Lecture 27 - Continuity of candidate solution at regular points - Part 2
- Lecture 28 - Summary of bounded solution to the Dirichlet Problem
- Lecture 29 - Stochastic representation of bounded solution to a heat equation - Part 1

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- Lecture 30 - Stochastic representation of bounded solution to a heat equation - Part 2
- Lecture 31 - Uniqueness of solution to the heat equation
- Lecture 32 - Remark on Tychonoff's Theorem
- Lecture 33 - Widder's result and its extension on heat equation
- Lecture 34 - Solution to the mixed initial boundary value problem
- Lecture 35 - The Feynman-Kac formula
- Lecture 36 - Kac's theorem on the stochastic representation of solution to a second-order linear ODE - Part 1
- Lecture 37 - Kac's theorem on the stochastic representation of solution to a second-order linear ODE - Part 2
- Lecture 38 - Geometric Brownian motion
- Lecture 39 - A system of stochastic differential equations in application
- Lecture 40 - Brownian bridge
- Lecture 41 - Simulation of stochastic differential equations
- Lecture 42 - Stochastic differential equations
- Lecture 43 - Stochastic differential equations
- Lecture 44 - Stochastic differential equations
- Lecture 45 - Stochastic differential equations
- Lecture 46 - Stochastic differential equations
- Lecture 47 - Functional Stochastic Differential Equations
- Lecture 48 - Statement of Dirichlet and Cauchy problems with variable coefficients elliptic operators
- Lecture 49 - Cauchy Problem with variable coefficients
- Lecture 50 - Cauchy Problem with variable coefficients
- Lecture 51 - Semigroup of bounded linear operators on Banach space - Part 1
- Lecture 52 - Semigroup of bounded linear operators on Banach space - Part 2
- Lecture 53 - Growth property of C_0 semigroup
- Lecture 54 - Unique semigroup generated by a bounded linear operator
- Lecture 55 - Homogeneous initial value problem
- Lecture 56 - Mild solution to homogeneous initial value problem
- Lecture 57 - Mild solution to inhomogeneous initial value problem
- Lecture 58 - Sufficient condition for existence of classical solution of IVP
- Lecture 59 - Tutorial on Resolvent operator
- Lecture 60 - Feynman-Kac formula and the formula of variations of constants
- Lecture 61 - Non-autonomous evolution problem and mild/generalized solution
- Lecture 62 - Sufficient condition for existence of an evolution system
- Lecture 63 - Y -valued solution
- Lecture 64 - mild/generalized solution to Semi-linear Evolution Problem
- Lecture 65 - Existence of classical solution - Part 1
- Lecture 66 - Existence of classical solution - Part 2
- Lecture 67 - Conclusion video

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NPTEL Video Course - Mathematics - NOC:Linear Algebra (Prof. Pranav Haridas)

Subject Co-ordinator - Prof. Pranav Haridas

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Vector Spaces
Lecture 2 - Examples of Vector Spaces
Lecture 3 - Vector Subspaces
Lecture 4 - Linear Combinations and Span
Lecture 5 - Linear Independence
Lecture 6 - Basis
Lecture 7 - Dimension
Lecture 8 - Replacement theorem consequences
Lecture 9 - Rank Nullity
Lecture 10 - Linear Transformations
Lecture 11 - Linear Transformation Basis
Lecture 12 - Linear Transformation and Matrices
Lecture 13 - Problem session
Lecture 14 - Linear Transformation and Matrices (Continued...)
Lecture 15 - Invertible Linear Transformations
Lecture 16 - Invertible Linear Transformations and Matrices
Lecture 17 - Change of Basis
Lecture 18 - Product of Vector Spaces
Lecture 19 - Quotient Spaces
Lecture 20 - Dual Spaces
Lecture 21 - Row operations
Lecture 22 - Rank of a Matrix
Lecture 23 - Inverting matrices
Lecture 24 - Determinants
Lecture 25 - Problem Session
Lecture 26 - Diagonal Matrices
Lecture 27 - Eigenvectors and eigenvalues
Lecture 28 - Computing eigenvalues
Lecture 29 - Characteristic polynomials

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- Lecture 30 - Diagonalizability
- Lecture 31 - Multiplicity of eigenvalues
- Lecture 32 - Invariant subspaces
- Lecture 33 - Complex Vector Spaces
- Lecture 34 - Inner Product Spaces
- Lecture 35 - Inner Product and Length
- Lecture 36 - Orthogonality
- Lecture 37 - Problem Session
- Lecture 38 - Problem Session
- Lecture 39 - Orthonormal Basis
- Lecture 40 - Gram Schmidt Orthogonalization
- Lecture 41 - Orthogonal Complements
- Lecture 42 - Problem Session
- Lecture 43 - Riesz Representation Theorem
- Lecture 44 - Adjoint of a linear transformation
- Lecture 45 - Problem Session
- Lecture 46 - Normal Operators
- Lecture 47 - Self Adjoint Operators
- Lecture 48 - Spectral Theorem

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NPTEL Video Course - Mathematics - NOC:Algebra - I

Subject Co-ordinator - Prof. Amritanshu Prasad, Prof. S. Viswanath

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Permutations
Lecture 2 - Group Axioms
Lecture 3 - Order and Conjugacy
Lecture 4 - Subgroups
Lecture 5 - Problem solving
Lecture 6 - Group Actions
Lecture 7 - Cosets
Lecture 8 - Group Homomorphisms
Lecture 9 - Normal subgroups
Lecture 10 - Quotient Groups
Lecture 11 - Product and Chinese Remainder Theorem
Lecture 12 - Dihedral Groups
Lecture 13 - Semidirect products
Lecture 14 - Problem solving
Lecture 15 - The Orbit Counting Theorem
Lecture 16 - Fixed points of group actions
Lecture 17 - Second application
Lecture 18 - Sylow Theorem - a preliminary proposition
Lecture 19 - Sylow Theorem - I
Lecture 20 - Problem solving - I
Lecture 21 - Problem solving - II
Lecture 22 - Sylow Theorem - II
Lecture 23 - Sylow Theorem - III
Lecture 24 - Problem solving - I
Lecture 25 - Problem solving - II
Lecture 26 - Free Groups - I
Lecture 27 - Free Groups - IIa
Lecture 28 - Free Groups - IIb
Lecture 29 - Free Groups - III

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- Lecture 30 - Free Groups - IV
- Lecture 31 - Problem Solving/Examples
- Lecture 32 - Generators and relations for symmetric groups \hat{A}_n I
- Lecture 33 - Generators and relations for symmetric groups \hat{A}_n II
- Lecture 34 - Definition of a Ring
- Lecture 35 - Euclidean Domains
- Lecture 36 - Gaussian Integers
- Lecture 37 - The Fundamental Theorem of Arithmetic
- Lecture 38 - Divisibility and Ideals
- Lecture 39 - Factorization and the Noetherian Condition
- Lecture 40 - Examples of Ideals in Commutative Rings
- Lecture 41 - Problem Solving/Examples
- Lecture 42 - The Ring of Formal Power Series
- Lecture 43 - Fraction Fields
- Lecture 44 - Path Algebra of a Quiver
- Lecture 45 - Ideals In Non-Commutative Rings
- Lecture 46 - Product of Rings
- Lecture 47 - Ring Homomorphisms
- Lecture 48 - Quotient Rings
- Lecture 49 - Problem solving
- Lecture 50 - Tensor and Exterior Algebras
- Lecture 51 - Modules
- Lecture 52 - Modules over polynomial rings $K[x]$
- Lecture 53 - Modules
- Lecture 54 - Modules
- Lecture 55 - Submodules
- Lecture 56 - General constructions of submodules
- Lecture 57 - Problem Solving
- Lecture 58 - Quotient modules
- Lecture 59 - Homomorphisms
- Lecture 60 - More examples of homomorphisms
- Lecture 61 - First isomorphism theorem
- Lecture 62 - Direct sums of modules
- Lecture 63 - Complementary submodules
- Lecture 64 - Change of ring
- Lecture 65 - Problem solving
- Lecture 66 - Free Modules (finitely generated)
- Lecture 67 - Determinants
- Lecture 68 - Primary Decomposition

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- Lecture 69 - Problem solving
- Lecture 70 - Finitely generated modules and the Noetherian condition
- Lecture 71 - Counterexamples to the Noetherian condition
- Lecture 72 - Generators and relations for Finitely Generated Modules
- Lecture 73 - General Linear Group over a Commutative Ring
- Lecture 74 - Equivalence of Matrices
- Lecture 75 - Smith Canonical Form for a Euclidean domain
- Lecture 76 - solved_problems1
- Lecture 77 - Smith Canonical Form for PID
- Lecture 78 - Structure of finitely generated modules over a PID
- Lecture 79 - Structure of a finitely generated abelian group
- Lecture 80 - Similarity of Matrices
- Lecture 81 - Deciding Similarity
- Lecture 82 - Rational Canonical Form
- Lecture 83 - Jordan Canonical Form

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NPTEL Video Course - Mathematics - NOC:Computational Commutative Algebra

Subject Co-ordinator - Prof. Manoj Kummini

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Definitions
Lecture 2 - Homomorphisms
Lecture 3 - Quotient rings
Lecture 4 - Noetherian rings
Lecture 5 - Monomials
Lecture 6 - Initial ideals
Lecture 7 - Division algorithm
Lecture 8 - Grobner basis
Lecture 9 - Solving Polynomial Equations
Lecture 10 - Nullstellensatz - Part 1
Lecture 11 - Nullstellensatz - Part 2
Lecture 12 - Buchberger criterion
Lecture 13 - Monomial basis
Lecture 14 - Elimination
Lecture 15 - Modules - Part 1
Lecture 16 - Modules - Part 2
Lecture 17 - Localisation
Lecture 18 - Nakayama Lemma
Lecture 19 - Spectrum - Part 1
Lecture 20 - Spectrum - Part 2
Lecture 21 - Associated primes
Lecture 22 - Primary Decomposition
Lecture 23 - Support of a module
Lecture 24 - Associated primes
Lecture 25 - Prime avoidance
Lecture 26 - Saturation - Part 1
Lecture 27 - Saturation - Part 2
Lecture 28 - Saturation - Part 3
Lecture 29 - Morphisms - Part 1

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- Lecture 30 - Morphisms - Part 2
- Lecture 31 - Integral extensions
- Lecture 32 - Noether normalisation lemma
- Lecture 33 - Noether normalisation lemma
- Lecture 34 - Polynomial rings
- Lecture 35 - Going up theorem
- Lecture 36 - Artinian rings
- Lecture 37 - Graded modules
- Lecture 38 - Hilbert polynomial
- Lecture 39 - Hilbert-Samuel polynomial
- Lecture 40 - Artin Rees Lemma
- Lecture 41 - Degree of Hilbert-Samuel polynomial
- Lecture 42 - Dimension of noetherian local rings - Part 1
- Lecture 43 - Dimension of noetherian local rings - Part 2
- Lecture 44 - Dimension of polynomial rings
- Lecture 45 - Algebras over a field
- Lecture 46 - Graded rings - Part 1
- Lecture 47 - Graded rings - Part 2
- Lecture 48 - Polynomial rings over fields
- Lecture 49 - Hilbert series - Part 1
- Lecture 50 - Hilbert series - Part 2
- Lecture 51 - Proj of a graded ring
- Lecture 52 - Homogenization - Part 1
- Lecture 53 - Homogenization - Part 2
- Lecture 54 - More on graded rings
- Lecture 55 - Free resolutions
- Lecture 56 - Computing syzygies
- Lecture 57 - Koszul complex
- Lecture 58 - More on Koszul complexes
- Lecture 59 - Castelnuovo Mumford regularity
- Lecture 60 - Castelnuovo Mumford regularity

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NPTEL Video Course - Mathematics - NOC:Laplace Transform

Subject Co-ordinator - Prof. Indrava Roy

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction and Motivation for Laplace transforms - Part 1
- Lecture 2 - Introduction and Motivation for Laplace transforms - Part 2
- Lecture 3 - Improper Riemann integrals
- Lecture 4 - Improper Riemann integrals
- Lecture 5 - Existence of Laplace transforms and Examples
- Lecture 6 - Properties of Laplace transforms-I - Part 1
- Lecture 7 - Properties of Laplace transforms-I - Part 2
- Lecture 8 - Existence of Laplace transforms for functions with vertical asymptote at the Y-axis - Part 1
- Lecture 9 - Existence of Laplace transforms for functions with vertical asymptote at the Y-axis - Part 2
- Lecture 10 - Properties of Laplace transforms-II - Part 1
- Lecture 11 - Properties of Laplace transforms-II - Part 2
- Lecture 12 - Laplace transform of Derivatives - Part 1
- Lecture 13 - Laplace transform of Derivatives - Part 2
- Lecture 14 - Laplace transform of Periodic functions and Integrals - I
- Lecture 15 - Laplace transform of Integrals-II - Part 1
- Lecture 16 - Laplace transform of Integrals-II - Part 2
- Lecture 17 - Inverse Laplace transform and asymptotic behaviour - Part 1
- Lecture 18 - Inverse Laplace transform and asymptotic behaviour - Part 2
- Lecture 19 - Methods of finding Inverse Laplace transform-I- Partial Fractions
- Lecture 20 - Methods of finding Inverse Laplace transform-II- Convolution theorem
- Lecture 21 - Convolution theorem for Laplace transforms
- Lecture 22 - Applications of Laplace transforms
- Lecture 23 - Applications of Laplace Transform to physical systems
- Lecture 24 - Solving Linear ODE's with polynomial coefficients
- Lecture 25 - Integral and Integro-differential equation
- Lecture 26 - Further application of Laplace transforms - Part 1
- Lecture 27 - Further application of Laplace transforms - Part 2

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

NPTEL Video Course - Mathematics - NOC:Measure Theory (Prof. Indrava Roy)

Subject Co-ordinator - Prof. Indrava Roy

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Finite Sets and Cardinality
- Lecture 2 - Infinite Sets and the Banach-Tarski Paradox - Part 1
- Lecture 3 - Infinite Sets and the Banach-Tarski Paradox - Part 2
- Lecture 4 - Elementary Sets and Elementary measure - Part 1
- Lecture 5 - Elementary Sets and Elementary measure - Part 2
- Lecture 6 - Properties of elementary measure - Part 1
- Lecture 7 - Properties of elementary measure - Part 2
- Lecture 8 - Uniqueness of elementary measure and Jordan measurability - Part 1
- Lecture 9 - Uniqueness of elementary measure and Jordan measurability - Part 2
- Lecture 10 - Characterization of Jordan measurable sets and basic properties of Jordan measure - Part 1
- Lecture 11 - Characterization of Jordan measurable sets and basic properties of Jordan measure - Part 2
- Lecture 12 - Examples of Jordan measurable sets-I
- Lecture 13 - Examples of Jordan measurable sets-II - Part 1
- Lecture 14 - Examples of Jordan measurable sets-II - Part 2
- Lecture 15 - Jordan measure under Linear transformations - Part 1
- Lecture 16 - Jordan measure under Linear transformations - Part 2
- Lecture 17 - Connecting the Jordan measure with the Riemann integral - Part 1
- Lecture 18 - Connecting the Jordan measure with the Riemann integral - Part 2
- Lecture 19 - Outer measure - Motivation and Axioms of outer measure
- Lecture 20 - Comparing Inner Jordan measure, Lebesgue outer measure and Jordan Outer measure
- Lecture 21 - Finite additivity of outer measure on Separated sets, Outer regularity - Part 1
- Lecture 22 - Finite additivity of outer measure on Separated sets, Outer regularity - Part 2
- Lecture 23 - Lebesgue measurable class of sets and their Properties - Part 1
- Lecture 24 - Lebesgue measurable class of sets and their Properties - Part 2
- Lecture 25 - Equivalent criteria for lebesgue measurability of a subset - Part 1
- Lecture 26 - Equivalent criteria for lebesgue measurability of a subset - Part 2
- Lecture 27 - The measure axioms and the Borel-Cantelli Lemma
- Lecture 28 - Properties of the Lebesgue measure
- Lecture 29 - Properties of the Lebesgue measure

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

- Lecture 30 - Lebesgue measurability under Linear transformation, Construction of Vitali Set - Part 1
- Lecture 31 - Lebesgue measurability under Linear transformation, Construction of Vitali Set - Part 2
- Lecture 32 - Abstract measure spaces
- Lecture 33 - Abstract measure and Caratheodory Measurability - Part 1
- Lecture 34 - Abstract measure and Caratheodory Measurability - Part 2
- Lecture 35 - Abstrsct measure and Hahn-Kolmogorov Extension
- Lecture 36 - Lebesgue measurable class vs Caratheodory extension of usual outer measure on \mathbb{R}^d
- Lecture 37 - Examples of Measures defined on \mathbb{R}^d via Hahn Kolmogorov extension - Part 1
- Lecture 38 - Examples of Measures defined on \mathbb{R}^d via Hahn Kolmogorov extension - Part 2
- Lecture 39 - Measurable functions
- Lecture 40 - Measurable functions
- Lecture 41 - Egorov's theorem
- Lecture 42 - Lebesgue integral of unsigned simple measurable functions
- Lecture 43 - Lebesgue integral of unsigned measurable functions
- Lecture 44 - Fundamental convergence theorems in Lebesgue integration
- Lecture 45 - Lebesgue integral for complex and real measurable functions
- Lecture 46 - Basic properties of L^1 -functions and Lebesgue's Dominated convergence theorem
- Lecture 47 - L^1 functions on \mathbb{R}^d
- Lecture 48 - L^1 functions on \mathbb{R}^d
- Lecture 49 - L^1 functions on \mathbb{R}^d
- Lecture 50 - L^1 functions on \mathbb{R}^d
- Lecture 51 - Various modes of convergence of measurable functions
- Lecture 52 - Easy implications from one mode of convergence to another
- Lecture 53 - Implication map for modes of convergence with various examples
- Lecture 54 - Uniqueness of limits across various modes of convergence
- Lecture 55 - Some criteria for reverse implications for modes of convergence
- Lecture 56 - Riesz Representation theorem- Motivation
- Lecture 57 - Basics on Locally compact Hausdorff spaces
- Lecture 58 - Borel and Radon measures on LCH spaces
- Lecture 59 - Properties of Radon measures and Lusin's theorem on LCH spaces
- Lecture 60 - Riesz Representation theorem - Complete statement and proof - Part 1
- Lecture 61 - Riesz Representation theorem - Complete statement and proof - Part 2
- Lecture 62 - Examples of measures constructed using RRT
- Lecture 63 - Theorems of Tonelli and Fubini- interchanging the order of integration for repeated integrals
- Lecture 64 - Product measures
- Lecture 65 - Tonelli's theorem for sets - Part 1
- Lecture 66 - Tonelli's theorem for sets - Part 2
- Lecture 67 - Fubini-Tonelli theorem
- Lecture 68 - Lebesgue's differentiation theorem

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

- Lecture 69 - Lebesgue's differentiation theorem
- Lecture 70 - Lebesgue's differentiation theorem
- Lecture 71 - Differentiation theorems
- Lecture 72 - Differentiation theorems
- Lecture 73 - Riesz's Rising Sun Lemma
- Lecture 74 - Differentiation theorem for monotone continuous functions
- Lecture 75 - Differentiation theorem for general monotone functions and Second fundamental theorem of calculus

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

NPTEL Video Course - Mathematics - NOC:Complex Analysis

Subject Co-ordinator - Prof. Pranav Haridas

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Field of Complex Numbers
Lecture 2 - Conjugation and Absolute value
Lecture 3 - Topology on Complex plane
Lecture 4 - Topology on Complex Plane (Continued...)
Lecture 5 - Problem Session
Lecture 6 - Isometries on the Complex Plane
Lecture 7 - Functions on the Complex Plane
Lecture 8 - Complex differentiability
Lecture 9 - Power Series
Lecture 10 - Differentiation of power series
Lecture 11 - Problem Session
Lecture 12 - Cauchy-Riemann equations
Lecture 13 - Harmonic functions
Lecture 14 - Möbius transformations
Lecture 15 - Problem session
Lecture 16 - Curves in the complex plane
Lecture 17 - Complex Integration over curves
Lecture 18 - First Fundamental theorem of Calculus
Lecture 19 - Second Fundamental theorem of Calculus
Lecture 20 - Problem session
Lecture 21 - Homotopy of curves
Lecture 22 - Cauchy-Goursat theorem
Lecture 23 - Cauchy's theorem
Lecture 24 - Problem Session
Lecture 25 - Cauchy Integral Formula
Lecture 26 - Principle of analytic continuation and Cauchy estimates
Lecture 27 - Further consequences of Cauchy Integral Formula
Lecture 28 - Problem session
Lecture 29 - Winding number

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

- Lecture 30 - Open mapping theorem
- Lecture 31 - Schwarz reflection principle
- Lecture 32 - Problem session
- Lecture 33 - Singularities of a holomorphic function
- Lecture 34 - Pole of a function
- Lecture 35 - Laurent Series
- Lecture 36 - Casorati Weierstrass theorem
- Lecture 37 - Problem Session
- Lecture 38 - Residue theorem
- Lecture 39 - Argument principle
- Lecture 40 - Problem Session
- Lecture 41 - Branch of the Complex logarithm
- Lecture 42 - Automorphisms of the Unit disk
- Lecture 43 - Phragmen Lindelof method
- Lecture 44 - Problem Session
- Lecture 45 - Lifting of maps
- Lecture 46 - Covering spaces
- Lecture 47 - Bloch's theorem
- Lecture 48 - Little Picard's theorem

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

NPTEL Video Course - Mathematics - NOC:Real Analysis - I

Subject Co-ordinator - Prof. Jaikrishnan J

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - WEEK 1 - INTRODUCTION
Lecture 2 - Why study Real Analysis
Lecture 3 - Square root of 2
Lecture 4 - Wason's selection task
Lecture 5 - Zeno's Paradox
Lecture 6 - Basic set theory
Lecture 7 - Basic logic
Lecture 8 - Quantifiers
Lecture 9 - Proofs
Lecture 10 - Functions and relations
Lecture 11 - Axioms of Set Theory
Lecture 12 - Equivalence relations
Lecture 13 - What are the rationals
Lecture 14 - Cardinality
Lecture 15 - WEEK 2 - INTRODUCTION
Lecture 16 - Field axioms
Lecture 17 - Order axioms
Lecture 18 - Absolute value
Lecture 19 - The completeness axiom
Lecture 20 - Nested intervals property
Lecture 21 - NIP+APâ Completeness
Lecture 22 - Existence of square roots
Lecture 23 - Uncountability of the real numbers
Lecture 24 - Density of rationals and irrationals
Lecture 25 - WEEK 3 - INTRODUCTION
Lecture 26 - Motivation for infinite sums
Lecture 27 - Definition of sequence and examples
Lecture 28 - Definition of convergence
Lecture 29 - Uniqueness of limits

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

- Lecture 30 - Achilles and the tortoise
- Lecture 31 - Deep dive into the definition of convergence
- Lecture 32 - A descriptive language for convergence
- Lecture 33 - Limit laws
- Lecture 34 - Subsequences
- Lecture 35 - Examples of convergent and divergent sequences
- Lecture 36 - Some special sequences-CORRECT
- Lecture 37 - Monotone sequences
- Lecture 38 - Bolzano-Weierstrass theorem
- Lecture 39 - The Cauchy Criterion
- Lecture 40 - MCT implies completeness
- Lecture 41 - Definition and examples of infinite series
- Lecture 42 - Cauchy tests-Corrected
- Lecture 43 - Tests for convergence
- Lecture 44 - Erdos's proof on divergence of reciprocals of primes
- Lecture 45 - Resolving Zeno's paradox
- Lecture 46 - Absolute and conditional convergence
- Lecture 47 - Absolute convergence continued
- Lecture 48 - The number e
- Lecture 49 - Grouping terms of an infinite series
- Lecture 50 - The Cauchy product
- Lecture 51 - WEEK 5 - INTRODUCTION
- Lecture 52 - The role of topology in real analysis
- Lecture 53 - Open and closed sets
- Lecture 54 - Basic properties of adherent and limit points
- Lecture 55 - Basic properties of open and closed sets
- Lecture 56 - Definition of continuity
- Lecture 57 - Deep dive into epsilon-delta
- Lecture 58 - Negating continuity
- Lecture 59 - The functions x and x^2
- Lecture 60 - Limit laws
- Lecture 61 - Limit of $\sin x$
- Lecture 62 - Relationship between limits and continuity
- Lecture 63 - Global continuity and open sets
- Lecture 64 - Continuity of square root
- Lecture 65 - Operations on continuous functions
- Lecture 66 - Language for limits
- Lecture 67 - Infinite limits
- Lecture 68 - One sided limits

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

- Lecture 69 - Limits of polynomials
- Lecture 70 - Compactness
- Lecture 71 - The Heine-Borel theorem
- Lecture 72 - Open covers and compactness
- Lecture 73 - Equivalent notions of compactness
- Lecture 74 - The extreme value theorem
- Lecture 75 - Uniform continuity
- Lecture 76 - Connectedness
- Lecture 77 - Intermediate Value Theorem
- Lecture 78 - Darboux continuity and monotone functions
- Lecture 79 - Perfect sets and the Cantor set
- Lecture 80 - The structure of open sets
- Lecture 81 - The Baire Category theorem
- Lecture 82 - Discontinuities
- Lecture 83 - Classification of discontinuities and monotone functions
- Lecture 84 - Structure of set of discontinuities
- Lecture 85 - WEEK 8 and 9 - INTRODUCTION
- Lecture 86 - Definition and interpretation of the derivative
- Lecture 87 - Basic properties of the derivative
- Lecture 88 - Examples of differentiation
- Lecture 89 - Darboux's theorem
- Lecture 90 - The mean value theorem
- Lecture 91 - Applications of the mean value theorem
- Lecture 92 - Taylor's theorem NEW
- Lecture 93 - The ratio mean value theorem and L'Hospital's rule
- Lecture 94 - Axiomatic characterisation of area and the Riemann integral
- Lecture 95 - Proof of axiomatic characterization
- Lecture 96 - The definition of the Riemann integral
- Lecture 97 - Criteria for Riemann integrability
- Lecture 98 - Linearity of integral
- Lecture 99 - Sets of measure zero
- Lecture 100 - The Riemann-Lebesgue theorem
- Lecture 101 - Consequences of the Riemann-Lebesgue theorem
- Lecture 102 - WEEK 10 and 11 - INTRODUCTION
- Lecture 103 - The fundamental theorem of calculus
- Lecture 104 - Taylor's theorem-Integral form of remainder
- Lecture 105 - Notation for Taylor polynomials
- Lecture 106 - Smooth functions and Taylor series
- Lecture 107 - Power series

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

- Lecture 108 - Definition of uniform convergence
- Lecture 109 - The exponential function
- Lecture 110 - The inverse function theorem
- Lecture 111 - The Logarithm
- Lecture 112 - Trigonometric functions
- Lecture 113 - The number Pi
- Lecture 114 - The graphs of sin and cos
- Lecture 115 - The Basel problem
- Lecture 116 - Improper integrals
- Lecture 117 - The Integral test
- Lecture 118 - Weierstrass approximation theorem
- Lecture 119 - Bernstein Polynomials
- Lecture 120 - Properties of Bernstein polynomials
- Lecture 121 - Proof of Weierstrass approximation theorem

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

NPTEL Video Course - Mathematics - NOC:Variational Calculus and its applications in Control Theory and Nanome

Subject Co-ordinator - Prof. Sarthok Sircar

Co-ordinating Institute - IIIT - Delhi

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

Lecture 1 - Introduction / Euler Lagrange Equations - Part 1
Lecture 2 - Introduction / Euler Lagrange Equations - Part 2
Lecture 3 - Introduction / Euler Lagrange Equations - Part 3
Lecture 4 - Introduction / Euler Lagrange Equations - Part 4
Lecture 5 - Introduction / Euler Lagrange Equations - Part 5
Lecture 6 - Introduction / Euler Lagrange Equations - Part 6
Lecture 7 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 1
Lecture 8 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 2
Lecture 9 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 3
Lecture 10 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 4
Lecture 11 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 5
Lecture 12 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 6
Lecture 13 - Generalization / Numerical solution of Euler Lagrange Equations - Part 1
Lecture 14 - Generalization / Numerical solution of Euler Lagrange Equations - Part 2
Lecture 15 - Generalization / Numerical solution of Euler Lagrange Equations - Part 3
Lecture 16 - Generalization / Numerical solution of Euler Lagrange Equations - Part 4
Lecture 17 - Generalization / Numerical solution of Euler Lagrange Equations - Part 5
Lecture 18 - Generalization / Numerical solution of Euler Lagrange Equations - Part 6
Lecture 19 - Isoperimetric Problems - Part 1
Lecture 20 - Isoperimetric Problems - Part 2
Lecture 21 - Isoperimetric Problems - Part 3
Lecture 22 - Isoperimetric Problems - Part 4
Lecture 23 - Isoperimetric Problems - Part 5
Lecture 24 - Isoperimetric Problems - Part 6
Lecture 25 - Problems with Holonomic and non- Holonomic Constraints, Variable Endpts - Part 1
Lecture 26 - Problems with Holonomic and non- Holonomic Constraints, Variable Endpts - Part 2
Lecture 27 - Problems with Holonomic and non- Holonomic Constraints, Variable Endpts - Part 3
Lecture 28 - Problems with Holonomic and non- Holonomic Constraints, Variable Endpts - Part 4
Lecture 29 - Problems with Holonomic and non- Holonomic Constraints, Variable Endpts - Part 5

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

- Lecture 30 - Problems with Holonomic and non- Holonomic Constraints, Variable Endpts - Part 6
- Lecture 31 - Broken extremals / Hamiltonian Formulation - Part 1
- Lecture 32 - Broken extremals / Hamiltonian Formulation - Part 2
- Lecture 33 - Broken extremals / Hamiltonian Formulation - Part 3
- Lecture 34 - Broken extremals / Hamiltonian Formulation - Part 4
- Lecture 35 - Broken extremals / Hamiltonian Formulation - Part 5
- Lecture 36 - Broken extremals / Hamiltonian Formulation - Part 6
- Lecture 37 - Hamilton-Jacobi Equations - Part 1
- Lecture 38 - Hamilton-Jacobi Equations - Part 2
- Lecture 39 - Hamilton-Jacobi Equations - Part 3
- Lecture 40 - Hamilton-Jacobi Equations - Part 4
- Lecture 41 - Hamilton-Jacobi Equations - Part 5
- Lecture 42 - Hamilton-Jacobi Equations - Part 6
- Lecture 43 - Noether's Theorem / Introduction to Second Variation - Part 1
- Lecture 44 - Noether's Theorem / Introduction to Second Variation - Part 2
- Lecture 45 - Noether's Theorem / Introduction to Second Variation - Part 3
- Lecture 46 - Noether's Theorem / Introduction to Second Variation - Part 4
- Lecture 47 - Noether's Theorem / Introduction to Second Variation - Part 5
- Lecture 48 - Noether's Theorem / Introduction to Second Variation - Part 6
- Lecture 49 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 1
- Lecture 50 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 2
- Lecture 51 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 3
- Lecture 52 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 4
- Lecture 53 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 5
- Lecture 54 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 6
- Lecture 55 - Constrained Optimization in Optimal Control Theory - Part 1
- Lecture 56 - Constrained Optimization in Optimal Control Theory - Part 2
- Lecture 57 - Constrained Optimization in Optimal Control Theory - Part 3
- Lecture 58 - Constrained Optimization in Optimal Control Theory - Part 4
- Lecture 59 - Constrained Optimization in Optimal Control Theory - Part 5
- Lecture 60 - Constrained Optimization in Optimal Control Theory - Part 6
- Lecture 61 - Introduction to Nanomechanics - Part 1
- Lecture 62 - Introduction to Nanomechanics - Part 2
- Lecture 63 - Introduction to Nanomechanics - Part 3
- Lecture 64 - Introduction to Nanomechanics - Part 4
- Lecture 65 - Introduction to Nanomechanics - Part 5
- Lecture 66 - Introduction to Nanomechanics - Part 6

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

NPTEL Video Course - Mathematics - NOC:Introduction to Galois Theory

Subject Co-ordinator - Prof. Krishna Hanumanthu

Co-ordinating Institute - Chennai Mathematical Institute

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

Lecture 1 - Motivation and overview of the course
Lecture 2 - Review of group theory
Lecture 3 - Review of ring theory - I
Lecture 4 - Review of ring theory - II
Lecture 5 - Review of field theory - I
Lecture 6 - Review of field theory - II
Lecture 7 - Review of field theory - III
Lecture 8 - Problem Session - Part 1
Lecture 9 - Problem Session - Part 2
Lecture 10 - Beginning of Galois theory
Lecture 11 - Fixed fields
Lecture 12 - Theorem I on fixed fields
Lecture 13 - Theorem II on fixed fields
Lecture 14 - Galois extensions, Galois groups
Lecture 15 - Normal extensions
Lecture 16 - Problem Session - Part 3
Lecture 17 - Problem Session - Part 4
Lecture 18 - Separable extension - Part 1
Lecture 19 - Separable extension - Part 2
Lecture 20 - Characterization of Galois extensions - Part 1
Lecture 21 - Characterization of Galois extensions - Part 2
Lecture 22 - Examples of Galois extensions
Lecture 23 - Motivating the main theorem of Galois theory
Lecture 24 - Main theorem of Galois theory - Part 1
Lecture 25 - Main theorem of Galois theory - Part 2
Lecture 26 - Fundamental theorem of algebra
Lecture 27 - Problem Session - Part 5
Lecture 28 - Problem Session - Part 6
Lecture 29 - Problem Session - Part 7

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- Lecture 30 - Problem Session - Part 8
- Lecture 31 - Problem Session - Part 9
- Lecture 32 - Kummer extensions - Part 1
- Lecture 33 - Kummer extensions - Part 2
- Lecture 34 - Kummer extensions - Part 3
- Lecture 35 - Cyclotomic extensions - Part 1
- Lecture 36 - Cyclotomic extensions - Part 2
- Lecture 37 - Solvability by radicals
- Lecture 38 - Characterizations of solvability - Part 1
- Lecture 39 - Characterizations of solvability - Part 2
- Lecture 40 - Discriminants, Galois groups of polynomials
- Lecture 41 - Quartics are solvable
- Lecture 42 - Solvable groups - Part 1
- Lecture 43 - Solvable groups - Part 2
- Lecture 44 - Solvable groups - Part 3
- Lecture 45 - Insolvability of quintics
- Lecture 46 - Problem Session - Part 10
- Lecture 47 - Problem Session - Part 11
- Lecture 48 - Problem Session - Part 12
- Lecture 49 - Problem Session - Part 13

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

NPTEL Video Course - Mathematics - NOC:Basic Calculus 1

Subject Co-ordinator - Prof. Arindama Singh

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - The Real line - Part 1
Lecture 2 - The Real line - Part 2
Lecture 3 - Absolute value - Part 1
Lecture 4 - Absolute value - Part 2
Lecture 5 - Functions - Part 1
Lecture 6 - Functions - Part 2
Lecture 7 - Transcendental and trigonometric Functions - Part 1
Lecture 8 - Transcendental and trigonometric Functions - Part 2
Lecture 9 - Limits of functions - Part 1
Lecture 10 - Limits of functions - Part 2
Lecture 11 - Algebra of limits - Part 1
Lecture 12 - Algebra of limits - Part 2
Lecture 13 - One-sided limits - Part 1
Lecture 14 - One-sided limits - Part 2
Lecture 15 - Limits at infinity - Part 1
Lecture 16 - Limits at infinity - Part 2
Lecture 17 - Infinite limits - Part 1
Lecture 18 - Infinite limits - Part 2
Lecture 19 - Continuity - Part 1
Lecture 20 - Continuity - Part 2
Lecture 21 - Algebra of continuous functions - Part 1
Lecture 22 - Algebra of continuous functions - Part 2
Lecture 23 - Results on continuity - Part 1
Lecture 24 - Results on continuity - Part 2
Lecture 25 - Differentiability - Part 1
Lecture 26 - Differentiability - Part 2
Lecture 27 - Derivative and tangent - Part 1
Lecture 28 - Derivative and tangent - Part 2
Lecture 29 - Rules of differentiation - Part 1

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- Lecture 30 - Rules of differentiation - Part 2
- Lecture 31 - Differentiation exercises - Part 1
- Lecture 32 - Differentiation exercises - Part 2
- Lecture 33 - Maxima and minima - Part 1
- Lecture 34 - Maxima and minima - Part 2
- Lecture 35 - Rolle's theorem and mean value theorem - Part 1
- Lecture 36 - Rolle's theorem and mean value theorem - Part 2
- Lecture 37 - Using Rolle's theorem and Mean value theorem - Part 1
- Lecture 38 - Using Rolle's theorem and Mean value theorem - Part 2
- Lecture 39 - First derivative test - Part 1
- Lecture 40 - First derivative test - Part 2
- Lecture 41 - Second derivative test - Part 1
- Lecture 42 - Second derivative test - Part 2
- Lecture 43 - Concavity - Part 1
- Lecture 44 - Concavity - Part 2
- Lecture 45 - Linearization and differential - Part 1
- Lecture 46 - Linearization and differential - Part 2
- Lecture 47 - L'Hôpital's rules - Part 1
- Lecture 48 - L'Hôpital's rules - Part 2
- Lecture 49 - Definite integral - Part 1
- Lecture 50 - Definite integral - Part 2
- Lecture 51 - Properties of integral - Part 1
- Lecture 52 - Properties of integral - Part 2
- Lecture 53 - Fundamental theorem of calculus - Part 1
- Lecture 54 - Fundamental theorem of calculus - Part 2
- Lecture 55 - Applications of Fundamental theorem of calculus - Part 1
- Lecture 56 - Applications of Fundamental theorem of calculus - Part 2
- Lecture 57 - Rule of substitution - Part 1
- Lecture 58 - Rule of substitution - Part 2
- Lecture 59 - Area between curves - Part 1
- Lecture 60 - Area between curves - Part 2
- Lecture 61 - Volumes by slicing - Part 1
- Lecture 62 - Volumes by slicing - Part 2
- Lecture 63 - The disk method - Part 1
- Lecture 64 - The disk method - Part 2
- Lecture 65 - The washer method - Part 1
- Lecture 66 - The washer method - Part 2
- Lecture 67 - Volumes by cylindrical shells - Part 1
- Lecture 68 - Volumes by cylindrical shells - Part 2

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- Lecture 69 - Lengths of curves - Part 1
- Lecture 70 - Lengths of curves - Part 2
- Lecture 71 - Areas of surface of revolution - Part 1
- Lecture 72 - Areas of surface of revolution - Part 2

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

NPTEL Video Course - Mathematics - NOC:Functional Analysis

Subject Co-ordinator - Prof. Kesavan

Co-ordinating Institute - Institute of Mathematical Sciences

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

Lecture 1 - Normed Linear Spaces
Lecture 2 - Examples of Normed Linear Spaces
Lecture 3 - Examples (Continued...)
Lecture 4 - Continuous linear maps - Part 1
Lecture 5 - Continuous linear maps - Part 2
Lecture 6 - Isomorphisms
Lecture 7 - Exercises
Lecture 8 - Exercises (Continued...)
Lecture 9 - Hahn-Banach Theorems
Lecture 10 - Reflexivity
Lecture 11 - Geometric version
Lecture 12 - Geometric version (Continued...)
Lecture 13 - Vector valued integration
Lecture 14 - Exercises - Part 1
Lecture 15 - Exercises - Part 2
Lecture 16 - Baire's Theorem and Applications
Lecture 17 - Application to Fourier series
Lecture 18 - Open mapping and closed graph theorems
Lecture 19 - Annihilators
Lecture 20 - Complemented subspaces
Lecture 21 - Unbounded Operators, Adjoints - Part 1
Lecture 22 - Unbounded Operators, Adjoints - Part 2
Lecture 23 - Orthogonality relations
Lecture 24 - Exercises
Lecture 25 - Exercises (Continued...)
Lecture 26 - Weak topology - Part 1
Lecture 27 - Weak topology - Part 2
Lecture 28 - Weak topology - Part 3
Lecture 29 - Weak* topology - Part 1

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- Lecture 30 - Weak* topology - Part 2
- Lecture 31 - Reflexive Spaces
- Lecture 32 - Separable Spaces - Part 1
- Lecture 33 - Separable Spaces - Part 2
- Lecture 34 - Uniformly Convex Spaces
- Lecture 35 - Applications
- Lecture 36 - Exercises
- Lecture 37 - L-p Spaces - Part 1
- Lecture 38 - L-p Spaces - Part 2
- Lecture 39 - Completeness
- Lecture 40 - Duality
- Lecture 41 - L-p Spaces in Euclidean spaces - Part 1
- Lecture 42 - L-p Spaces in Euclidean spaces - Part 2
- Lecture 43 - Dual of L-1
- Lecture 44 - The space L-1 (Continued...)
- Lecture 45 - Exercises - Part 1
- Lecture 46 - Exercises - Part 2
- Lecture 47 - Exercises - Part 3
- Lecture 48 - Exercises - Part 4
- Lecture 49 - Hilbert spaces - Part 1
- Lecture 50 - Hilbert spaces - Part 2
- Lecture 51 - Duality
- Lecture 52 - Adjoints
- Lecture 53 - Applications
- Lecture 54 - Orthonormal sets
- Lecture 55 - Orthonormal bases - Part 1
- Lecture 56 - Orthonormal bases - Part 2
- Lecture 57 - Fourier series
- Lecture 58 - Spectrum of an operator - Part 1
- Lecture 59 - Spectrum of an operator - Part 2
- Lecture 60 - Exercises - Part 1
- Lecture 61 - Exercises - Part 2
- Lecture 62 - Exercises - Part 3
- Lecture 63 - Compact operators - Part 1
- Lecture 64 - Compact operators - Part 2
- Lecture 65 - Riesz-Fredholm theory - Part 1
- Lecture 66 - Riesz-Fredholm theory - Part 2
- Lecture 67 - Riesz-Fredholm theory
- Lecture 68 - Spectrum of a compact operator

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

- Lecture 69 - Spectrum of a compact self-adjoint operator
- Lecture 70 - Eigenvalues of a compact self-adjoint operator
- Lecture 71 - Exercises - Part 1
- Lecture 72 - Exercises - Part 2
- Lecture 73 - Exercises - Part 3
- Lecture 74 - Exercises - Part 4

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

- 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

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

NPTEL Video Course - Mathematics - NOC:Computational Mathematics with SageMath

Subject Co-ordinator - Prof. Ajit Kumar

Co-ordinating Institute - Institute of Chemical Technology - Mumbai

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

- Lecture 1 - Installation of Python
- Lecture 2 - Getting Started with Python
- Lecture 3 - Python as an advanced calculator
- Lecture 4 - Lists in Python
- Lecture 5 - Tuple, Sets and Dictionaries in Python
- Lecture 6 - Functions and Branching
- Lecture 7 - For loop in Python
- Lecture 8 - While loop in Python
- Lecture 9 - Creating Modules and Introduction to NumPy
- Lecture 10 - Use of NumPy module
- Lecture 11 - Python Graphics using Matplotlib
- Lecture 12 - Use of SciPy and SymPy in Python
- Lecture 13 - Classes in Python - Part 1
- Lecture 14 - Classes in Python - Part 2
- Lecture 15 - Introduction and Installation of SageMath
- Lecture 16 - Exploring integers in SageMath
- Lecture 17 - Solving Equations in SageMath
- Lecture 18 - 2d Plotting with SageMath
- Lecture 19 - 3d Plotting with SageMath
- Lecture 20 - Calculus of one variable with SageMath - Part 1
- Lecture 21 - Calculus of one variable with SageMath - Part 2
- Lecture 22 - Applications of derivatives
- Lecture 23 - Integration with SageMath
- Lecture 24 - Improper Integral using SageMath
- Lecture 25 - Application of integration using SageMath
- Lecture 26 - Limit and Continuity of real valued functions
- Lecture 27 - Partial Derivative with SageMath
- Lecture 28 - Local Maximum and Minimum
- Lecture 29 - Application of local maximum and local minimum

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

- Lecture 30 - Constrained optimization using Lagrange multipliers
- Lecture 31 - Working with vectors in SageMath
- Lecture 32 - Solving system of linear Equations in SageMath
- Lecture 33 - Vector Spaces in SageMath
- Lecture 34 - Basis and dimensions of vector spaces in SageMath
- Lecture 35 - Matrix Spaces with SageMath
- Lecture 36 - Linear Transformations - Part 1 with SageMath
- Lecture 37 - Linear Transformations - Part 2 with SageMath
- Lecture 38 - Eigenvalues and Eigenvectors - Part 1 with SageMath
- Lecture 39 - Eigenvalues and Eigenvectors - Part 2 with SageMath
- Lecture 40 - Inner Product - Part 1 with SageMath
- Lecture 41 - Inner Product - Part 2 with SageMath
- Lecture 42 - Orthogonal Decomposition with SageMath
- Lecture 43 - Least Square Solution with SageMath
- Lecture 44 - Singular Value Decomposition (SVD) with SageMath
- Lecture 45 - Application of SVD to image processing
- Lecture 46 - Solving System of linear ODE using Eigenvalues and Eigenvectors
- Lecture 47 - Google Page Rank Algorithm using SageMath
- Lecture 48 - Finding Roots of algebraic and transcendental equations in SageMath
- Lecture 49 - Numerical Solutions of System of linear equations in SageMath
- Lecture 50 - Interpolations in SageMath
- Lecture 51 - Numerical Integration in SageMath
- Lecture 52 - Numerical Eigenvalues
- Lecture 53 - Solving 1st and 2nd order ODE with SageMath
- Lecture 54 - Euler's Method to solve 1st order ODE with SageMath
- Lecture 55 - Fourth Order Runge-Kutta Method
- Lecture 56 - RK4 method for System of ODE and Applications
- Lecture 57 - Solving ODE using Laplace Transforms in SageMath
- Lecture 58 - Introduction to Linear Programming Problems (LPP)
- Lecture 59 - Solving Linear Programming Problems using Graphical Methods
- Lecture 60 - Basics Definitions and Results in LPP
- Lecture 61 - Theory of Simplex Method
- Lecture 62 - Simplex Methods in SageMath - Part 1
- Lecture 63 - Simplex Methods in SageMath - Part 2
- Lecture 64 - Simplex Methods in Matrix Form
- Lecture 65 - Revised Simplex Method in SageMath
- Lecture 66 - Two Phase Simplex Method in SageMath
- Lecture 67 - Big-M Method in SageMath
- Lecture 68 - Duality of Linear Program

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

- Lecture 69 - Dual Simplex Method in SageMath
- Lecture 70 - Review and What next in SageMath?

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

NPTEL Video Course - Mathematics - NOC:Introduction to Probability (with examples using R)

Subject Co-ordinator - Prof. Siva Athreya

Co-ordinating Institute - ISI - Bangalore

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

Lecture 1 - Sample Space, Events and Probability
Lecture 2 - Properties of Probability
Lecture 3 - Equally likely Outcomes
Lecture 4 - Conditional Probability
Lecture 5 - Bayes Theorem
Lecture 6 - Independence - Part 1
Lecture 7 - Independence - Part 2
Lecture 8 - Sampling and Repeated Trials
Lecture 9 - Sampling and Repeated Trials - Part 1
Lecture 10 - Sampling and Repeated Trials - Part 2
Lecture 11 - Sampling with and Without Replacement
Lecture 12 - Sampling without Replacement
Lecture 13 - Hypergeometric Distribution and Discrete Random Variables
Lecture 14 - Discrete Random Variables - Part 1
Lecture 15 - Discrete Random Variables - Part 2
Lecture 16 - Conditional, Joint and Marginal Distributions
Lecture 17 - Memoryless property of Geometric Distribution
Lecture 18 - Functions of Random Variables
Lecture 19 - Sums of Independent Random Variables
Lecture 20 - Functions and Independence
Lecture 21 - Expectation of Random Variables
Lecture 22 - Properties of Expectation
Lecture 23 - Expectation: Independence and Functions
Lecture 24 - Variance of Discrete Random Variables
Lecture 25 - Markov and Chebyshev Inequalities
Lecture 26 - Conditional Expectation and Covariance
Lecture 27 - Continuous Random Variables - Part 1
Lecture 28 - Continuous Random Variables - Part 2
Lecture 29 - Distribution Function

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- Lecture 30 - Exponential and Normal Random Variable
- Lecture 31 - Normal Random Variable
- Lecture 32 - Change of Variable
- Lecture 33 - Joint Distribution of Continuous Random Variables
- Lecture 34 - Marginal Density and Independence
- Lecture 35 - Conditional Density
- Lecture 36 - Sums of Independent Random Variables
- Lecture 37 - Quotient of Independent Random Variables
- Lecture 38 - Expectation and Variance of Continuous Random Variables
- Lecture 39 - Sampling Distribution and Sample Mean
- Lecture 40 - Weak Law of Large Numbers
- Lecture 41 - Revisit of Variance and Expectation
- Lecture 42 - Revisit of Properties of Variance
- Lecture 43 - Revisit Weak Law of Large Numbers
- Lecture 44 - Demoivre-Laplace Central Limit Theorem and Normal Random Variables
- Lecture 45 - Revisit Normal Random Variables
- Lecture 46 - Normal Tables, Mean and Variance

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

NPTEL Video Course - Mathematics - NOC:Algebra-II

Subject Co-ordinator - Prof. Amritanshu Prasad, Prof. S. Viswanath

Co-ordinating Institute - Institute of Mathematical Sciences

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

- Lecture 1 - Algebraic and Transcendental Numbers
- Lecture 2 - Extensions Generated by Elements
- Lecture 3 - Isomorphic Extensions
- Lecture 4 - Degree of an Extension
- Lecture 5 - Constructible Numbers
- Lecture 6 - The Field of Constructible Numbers
- Lecture 7 - Characterization of Constructible Numbers
- Lecture 8 - Solved Problems (Week 1)
- Lecture 9 - Some Things can't be Constructed
- Lecture 10 - Symbolic Adjunction
- Lecture 11 - Repeated Roots
- Lecture 12 - Gauss Lemma
- Lecture 13 - Eisenstein's criterion
- Lecture 14 - Existence Theorem for Finite Fields
- Lecture 15 - Subfields of a Finite Field
- Lecture 16 - Multiplicative Group of a Finite Field
- Lecture 17 - Uniqueness Theorem for Finite Fields
- Lecture 18 - Solved Problems (Week 2)
- Lecture 19 - Algebraic Extensions and Algebraic Closures
- Lecture 20 - Existence of Algebraic Closures
- Lecture 21 - Uniqueness of Algebraic Closure
- Lecture 22 - Solved Problems - Part 1 (Week 3)
- Lecture 23 - Existence of splitting fields, bound on degree
- Lecture 24 - Uniqueness of splitting fields
- Lecture 25 - Solved problems - Part 2 (Week 3)
- Lecture 26 - Normal Extensions
- Lecture 27 - Separable polynomials
- Lecture 28 - Perfect fields, separable extensions
- Lecture 29 - Definition and examples, fixed fields

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

- Lecture 30 - Characterization of Galois extensions
- Lecture 31 - Linear Independence of Characters
- Lecture 32 - Solved problems (Week 4)
- Lecture 33 - Artin's Theorem - Part 1
- Lecture 34 - Artin's Theorem - Part 2
- Lecture 35 - Finite Galois Extensions
- Lecture 36 - The fundamental theorem of Galois Theory - 1
- Lecture 37 - The fundamental theorem of Galois Theory - 2
- Lecture 38 - Solved problems (Week 5)
- Lecture 39 - Cyclotomic extensions
- Lecture 40 - Irreducibility of the cyclotomic polynomial
- Lecture 41 - Application: Constructibility of regular n-gons.
- Lecture 42 - Insolvability of the general quintic - Part 1
- Lecture 43 - Insolvability of the general quintic - Part 2
- Lecture 44 - Insolvability of the general quintic - Part 3
- Lecture 45 - What is category theory (and why is it important)?
- Lecture 46 - Definition of a category
- Lecture 47 - Monomorphisms, epimorphisms, and isomorphisms
- Lecture 48 - Categories: First Problem Session
- Lecture 49 - Initial and Terminal Objects
- Lecture 50 - Products and Coproducts
- Lecture 51 - Categories: Second Problem Session
- Lecture 52 - Functors
- Lecture 53 - The Category of Categories
- Lecture 54 - Natural Transformations
- Lecture 55 - Functor Categories
- Lecture 56 - Categories: Third Problem Session
- Lecture 57 - Adjunction
- Lecture 58 - Categories: Fourth Problem Session
- Lecture 59 - Tensor products of \mathbb{Z} -modules
- Lecture 60 - Free abelian groups and quotient groups
- Lecture 61 - Construction of the tensor product
- Lecture 62 - Problem session
- Lecture 63 - Tensor product of \mathbb{R} -modules
- Lecture 64 - Functoriality of the tensor product
- Lecture 65 - Bimodules
- Lecture 66 - Tensor products of bimodules
- Lecture 67 - Tensor products of modules over commutative rings
- Lecture 68 - Extension of scalars

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

- Lecture 69 - Problem session - tensor products of vector spaces
- Lecture 70 - Some Properties of the tensor product
- Lecture 71 - F-algebras
- Lecture 72 - Composition Series
- Lecture 73 - Schreier's Theorem
- Lecture 74 - Ascending and Descending Chain Conditions
- Lecture 75 - Existence of Jordan-Holder Series
- Lecture 76 - The Jordan-Holder Theorem
- Lecture 77 - Examples related to the Jordan-Holder Theorem
- Lecture 78 - The Jordan-Holder Theorem for Groups
- Lecture 79 - Indecomposable Modules
- Lecture 80 - Direct Sum Decompositions
- Lecture 81 - Decomposition as a sum of Indecomposables
- Lecture 82 - The Endomorphism Ring of an Indecomposable Module
- Lecture 83 - Krull-Schmidt Theorem
- Lecture 84 - Krull-Schmidt Examples

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

NPTEL Video Course - Mathematics - NOC:Mathematical Methods in Physics 2

Subject Co-ordinator - Prof. Auditya Sharma

Co-ordinating Institute - IISER - Bhopal

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

- Lecture 1 - Introduction to complex numbers
- Lecture 2 - The triangle inequality
- Lecture 3 - The de Moivre formula
- Lecture 4 - Roots of unity
- Lecture 5 - Functions of a complex variable and the notion of continuity
- Lecture 6 - Derivative of a complex function
- Lecture 7 - Differentiation rules for a complex function
- Lecture 8 - Cauchy-Riemann Equations
- Lecture 9 - Sufficient conditions for differentiability
- Lecture 10 - Cauchy-Riemann conditions in polar coordinates
- Lecture 11 - More perspective on differentiability
- Lecture 12 - The value of the derivative
- Lecture 13 - Analytic functions
- Lecture 14 - Harmonic functions
- Lecture 15 - The exponential function
- Lecture 16 - Complex logarithm
- Lecture 17 - Complex exponents
- Lecture 18 - Trigonometric functions of complex variables
- Lecture 19 - Hyperbolic functions of complex variables
- Lecture 20 - Inverse Trigonometric and Hyperbolic functions
- Lecture 21 - Branch of a multivalued function
- Lecture 22 - Contour Integrals
- Lecture 23 - Green's Theorem
- Lecture 24 - Path dependence of the contour integral
- Lecture 25 - Antiderivatives
- Lecture 26 - The Cauchy theorem
- Lecture 27 - Crossing contours and multiply connected domains
- Lecture 28 - Cauchy Integral formula
- Lecture 29 - Derivatives of an analytic function

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

- Lecture 30 - Liouville's theorem and the Fundamental theorem of algebra
- Lecture 31 - Taylor Series
- Lecture 32 - Laurent Series
- Lecture 33 - Convergence
- Lecture 34 - Differentiation and integration of power series
- Lecture 35 - Isolated Singularities
- Lecture 36 - Residues
- Lecture 37 - Residue Theorem
- Lecture 38 - Evaluation of integrals - I
- Lecture 39 - Evaluation of integrals - II
- Lecture 40 - Analytic Continuation
- Lecture 41 - Introduction of orthogonal polynomials
- Lecture 42 - How to construct orthogonal polynomials
- Lecture 43 - The weight function
- Lecture 44 - Recursion relations
- Lecture 45 - Differential equation satisfied by the orthogonal polynomials
- Lecture 46 - Hermite polynomials
- Lecture 47 - Properties of Hermite polynomials
- Lecture 48 - Legendre polynomials
- Lecture 49 - Legendre polynomials: recurrence relation
- Lecture 50 - Differential equation corresponding to Legendre polynomials
- Lecture 51 - The generating function corresponding to Legendre polynomials
- Lecture 52 - Laguerre Polynomials
- Lecture 53 - Laguerre Polynomials: recurrence relation
- Lecture 54 - Laguerre polynomials: differential equation
- Lecture 55 - Laguerre polynomials: generating function
- Lecture 56 - Bessel functions: series definition
- Lecture 57 - Bessel functions: recurrence relations
- Lecture 58 - Bessel functions: differential equation
- Lecture 59 - Bessel functions of integral order: generating function
- Lecture 60 - Bessel functions: orthogonality
- Lecture 61 - Classification of Second Order PDEs
- Lecture 62 - Canonical Forms for Hyperbolic PDEs
- Lecture 63 - Canonical Forms for Parabolic PDEs
- Lecture 64 - Canonical Forms for Elliptic PDEs
- Lecture 65 - The Laplace Equation
- Lecture 66 - The Laplace Equation: Separation of Variables
- Lecture 67 - The Laplace Equation: Dirichlet and Neumann boundary conditions
- Lecture 68 - The Laplace Equation in Cartesian coordinates

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

- Lecture 69 - The Laplace Equation for a 3-D rectangular box
- Lecture 70 - The Laplace Equation in spherical coordinates
- Lecture 71 - The Laplace Equation in Spherical Coordinates: Solution
- Lecture 72 - The Laplace Equation in Spherical Coordinates: illustrative examples
- Lecture 73 - The Poisson's Equation: Green's function solution
- Lecture 74 - The heat equation: a heuristic discussion
- Lecture 75 - From the random walk to the diffusion equation
- Lecture 76 - Solution of the Diffusion equation
- Lecture 77 - The Diffusion equation with Dirichlet and Neumann boundary conditions
- Lecture 78 - The Heat equation: illustrative examples
- Lecture 79 - The Wave equation: Method of characteristics
- Lecture 80 - The Wave equation: Separation of variables

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NPTEL Video Course - Mathematics - NOC:Real Analysis - II

Subject Co-ordinator - Prof. Jaikrishnan J

Co-ordinating Institute - IIT - Palakkad

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

- Lecture 1 - Metric Spaces
- Lecture 2 - Examples of metric spaces
- Lecture 3 - Loads of definitions
- Lecture 4 - Normed vector spaces
- Lecture 5 - Examples of normed vector spaces
- Lecture 6 - Basic properties open closed sets metric
- Lecture 7 - Continuity in metric spaces
- Lecture 8 - Equivalent metrics and product spaces
- Lecture 9 - Completeness
- Lecture 10 - Completeness (Continued...)
- Lecture 11 - Completeness of $B(x,y)$
- Lecture 12 - Completion
- Lecture 13 - Compactness
- Lecture 14 - The Bolzano-Weierstrass Property
- Lecture 15 - Open covers and Compactness
- Lecture 16 - The Heine-Borel Theorem for Metric Spaces
- Lecture 17 - Connectedness
- Lecture 18 - Path-Connectedness
- Lecture 19 - Connected Components
- Lecture 20 - The Arzela-Ascoli theorem
- Lecture 21 - Upper and lower limits
- Lecture 22 - The Stone-Weierstrass theorem
- Lecture 23 - All norms are equivalent
- Lecture 24 - Vector-valued functions
- Lecture 25 - Scalar-valued functions of a vector variable
- Lecture 26 - Directional derivatives and the gradient
- Lecture 27 - Interpretation and properties of the gradient
- Lecture 28 - Higher-order partial derivatives
- Lecture 29 - The derivative as a linear map

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

- Lecture 30 - Examples of differentiation
- Lecture 31 - Properties of the derivative map
- Lecture 32 - The mean-value theorem
- Lecture 33 - Differentiating under the integral sign
- Lecture 34 - Higher-order derivatives
- Lecture 35 - Symmetry of the second derivative
- Lecture 36 - Taylor's theorem
- Lecture 37 - Taylor's theorem with remainder
- Lecture 38 - The Banach fixed point theorem
- Lecture 39 - Newton's method
- Lecture 40 - The inverse function theorem
- Lecture 41 - Diffeomorphism and local diffeomorphisms
- Lecture 42 - The implicit function theorem
- Lecture 43 - Tangent space to a hypersurface
- Lecture 44 - The definition of a manifold
- Lecture 45 - Examples and non examples of manifolds
- Lecture 46 - The tangent space to a manifold
- Lecture 47 - Maxima and minima in several variables
- Lecture 48 - The Hessian and extrema
- Lecture 49 - Completing the squares
- Lecture 50 - Constrained extrema and lagrange multipliers
- Lecture 51 - Curves
- Lecture 52 - Rectifiability and arc-length
- Lecture 53 - The Riemann integral revisited
- Lecture 54 - Monotone sequences of functions
- Lecture 55 - Upper functions and their integrals
- Lecture 56 - Riemann integrable functions as upper functions
- Lecture 57 - Lebesgue integrable functions
- Lecture 58 - Approximation of Lebesgue integrable functions
- Lecture 59 - Levi monotone convergence theorem for step functions
- Lecture 60 - Monotone convergence theorem for upper functions
- Lecture 61 - Monotone convergence theorem for Lebesgue integrable functions
- Lecture 62 - The Lebesgue dominated convergence theorem
- Lecture 63 - Applications of the convergence theorems
- Lecture 64 - The problem of measure
- Lecture 65 - The Lebesgue integral on unbounded intervals
- Lecture 66 - Measurable functions
- Lecture 67 - Solution to the problem of measure
- Lecture 68 - The Lebesgue integral on arbitrary subsets

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

- Lecture 69 - Square integrable functions
- Lecture 70 - Norms and inner-products on complex vector spaces
- Lecture 71 - Convergence in L^2
- Lecture 72 - The Riesz-Fischer theorem
- Lecture 73 - Multiple Riemann integration
- Lecture 74 - Multiple Lebesgue integration

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

NPTEL Video Course - Mathematics - NOC:Sobolev Spaces and Partial Differential Equations

Subject Co-ordinator - Prof. Kesavan

Co-ordinating Institute - IMSc

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

Lecture 1 - Test Functions - Part 1
Lecture 2 - Test Functions - Part 2
Lecture 3 - Distributions
Lecture 4 - Examples - Part 1
Lecture 5 - Distribution Derivatives
Lecture 6 - More operations on distributions
Lecture 7 - Support of a distribution
Lecture 8 - Distributions with compact support; singular support - Part 1
Lecture 9 - Distributions with compact support; singular support - Part 2
Lecture 10 - Exercises - Part 1
Lecture 11 - Convolution of functions - Part 1
Lecture 12 - Convolution of functions - Part 2
Lecture 13 - Convolution of functions - Part 3
Lecture 14 - Convolution of distributions - Part 1
Lecture 15 - Convolution of distributions - Part 2
Lecture 16 - Convolution of distributions - Part 3
Lecture 17 - Exercises - Part 2
Lecture 18 - Fundamental solutions
Lecture 19 - The Fourier transform
Lecture 20 - The Schwarz space - Part 1
Lecture 21 - The Schwarz space - Part 2
Lecture 22 - Examples - Part 1
Lecture 23 - Fourier inversion formula
Lecture 24 - Tempered distributions
Lecture 25 - Exercises - Part 3
Lecture 26 - Sobolev spaces - Part 1
Lecture 27 - Sobolev spaces - Part 2
Lecture 28 - Sobolev spaces - Part 3
Lecture 29 - Approximation by smooth functions

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- Lecture 30 - Chain rule and applications - Part 1
- Lecture 31 - Chain rule and applications - Part 2
- Lecture 32 - Extension theorems - Part 1
- Lecture 33 - Extension theorems - Part 2
- Lecture 34 - Poincare's inequality
- Lecture 35 - Exercises - Part 4
- Lecture 36 - Exercises - Part 5
- Lecture 37 - Imbedding theorems
- Lecture 38 - Imbedding theorems: Case p less than N - Part 1
- Lecture 39 - Imbedding theorems: Case $p = N$ - Part 2
- Lecture 40 - Imbedding theorems: Case p greater than N - Part 3
- Lecture 41 - Compactness theorems - Part 1
- Lecture 42 - Compactness theorems - Part 2
- Lecture 43 - Compactness theorems - Part 3
- Lecture 44 - The spaces $W^{\{s,p\}}$
- Lecture 45 - spaces $W^{\{s,p\}}$ and Trace spaces
- Lecture 46 - Trace theory - Part 1
- Lecture 47 - Trace theory - Part 2
- Lecture 48 - Trace theory - Part 3
- Lecture 49 - Trace theory - Part 4
- Lecture 50 - Exercises - Part 6
- Lecture 51 - Exercises - Part 7
- Lecture 52 - Abstract variational problems - Part 1
- Lecture 53 - Abstract variational problems - Part 2
- Lecture 54 - Weak solutions of elliptic boundary value problems - Part 1
- Lecture 55 - Weak solutions of elliptic boundary value problems - Part 2
- Lecture 56 - Neumann problems
- Lecture 57 - The Biharmonic operator
- Lecture 58 - The elasticity system
- Lecture 59 - Exercises - Part 8
- Lecture 60 - Exercises - Part 9
- Lecture 61 - Exercises - Part 9
- Lecture 62 - Maximum Principles - Part 1
- Lecture 63 - Maximum Principles - Part 2
- Lecture 64 - Exercises - Part 10
- Lecture 65 - Exercises - Part 11
- Lecture 66 - Eigenvalue problems - Part 1
- Lecture 67 - Eigenvalue problems - Part 2
- Lecture 68 - Eigenvalue problems - Part 3

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

- Lecture 69 - Exercises - Part 12
- Lecture 70 - Exercises - Part 13
- Lecture 71 - Unbounded operators - Part 1
- Lecture 72 - Unbounded operators - Part 2
- Lecture 73 - The exponential map
- Lecture 74 - C_0 Semigroups - Part 1
- Lecture 75 - C_0 Semigroups - Part 2
- Lecture 76 - Infinitesimal generators of contraction semigroups
- Lecture 77 - Hille-Yosida theorem
- Lecture 78 - Regularity
- Lecture 79 - Contraction semigroups on Hilbert spaces
- Lecture 80 - Self-adjoint case and the case of isometries
- Lecture 81 - The heat equation
- Lecture 82 - The wave equation
- Lecture 83 - The Schrodinger equation
- Lecture 84 - The inhomogeneous equation
- Lecture 85 - Exercises - 14

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

NPTEL Video Course - Mathematics - NOC:Combinatorics

Subject Co-ordinator - Prof. Narayanan N

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Pigeonhole Principle
- Lecture 2 - Dirichlet theorem and Erdos-Szekeres Theorem
- Lecture 3 - Ramey theorem as generalisation of PHP
- Lecture 4 - An infinite flock of Pigeons
- Lecture 5 - Basic Counting - the sum and product rules
- Lecture 6 - Examples of basic counting
- Lecture 7 - Examples: Product and Division rules
- Lecture 8 - Binomial theorem and bijective counting
- Lecture 9 - Counting lattice paths
- Lecture 10 - Multinomial theorem
- Lecture 11 - Applying Multinomial theorem
- Lecture 12 - Integer compositions
- Lecture 13 - Set partitions and Stirling numbers
- Lecture 14 - Stirling and Hemachandra recursions
- Lecture 15 - Integer partitions
- Lecture 16 - Young's diagram and Integer partitions
- Lecture 17 - Principle of Inclusion and Exclusion
- Lecture 18 - Applications of PIE
- Lecture 19 - The twelvefold way
- Lecture 20 - Inclusion exclusion: Linear algebra view
- Lecture 21 - Partial Orders
- Lecture 22 - Mobius Inversion Formula
- Lecture 23 - Product theorem and applications of Mobius Inversion
- Lecture 24 - Formal power series, ordinary generating functions
- Lecture 25 - Application of Ordinary generating functions
- Lecture 26 - Product of Generating functions
- Lecture 27 - Composition of generating functions
- Lecture 28 - Exponential Generating Function
- Lecture 29 - Composition of EGF

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

- Lecture 30 - Euler pentagonal number theorem
- Lecture 31 - Graphs - introduction
- Lecture 32 - Paths Walks, Cycles
- Lecture 33 - Digraphs and functional digraphs
- Lecture 34 - Componenets, Connectivity, Bipartite graphs
- Lecture 35 - Acyclic graphs
- Lecture 36 - Graph colouring
- Lecture 37 - Mycielski graphs
- Lecture 38 - Product of graphs
- Lecture 39 - Menger's theorem
- Lecture 40 - System of Distinct representatives
- Lecture 41 - Planar graphs
- Lecture 42 - Euler identity
- Lecture 43 - Map colouring problem - History
- Lecture 44 - The Discharging Method - Part 1
- Lecture 45 - The Discharging Method - Part 2
- Lecture 46 - Introduction to Group actions
- Lecture 47 - Colouring and symmetries - examples
- Lecture 48 - Bursides lemma
- Lecture 49 - Proof of Bursides lemma
- Lecture 50 - Polya's theorem
- Lecture 51 - Species of structures- definitions and examples
- Lecture 52 - Associated seris and Product of species
- Lecture 53 - Species: Substitution and Derivative
- Lecture 54 - Species: Pointing and countilg labelled trees
- Lecture 55 - Review and Further directions
- Lecture 56 - More on further topics
- Lecture 57 - Linear Algebra method: Ultra short introduction
- Lecture 58 - Probabiistic Method: Ultra short introduction

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

NPTEL Video Course - Mathematics - NOC:Our Mathematical Senses

Subject Co-ordinator - Prof. Vijay Ravikumar

Co-ordinating Institute - Chennai Mathematical Institute

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

- Lecture 1 - Why do the images of parallel lines converge?
- Lecture 2 - The power of vanishing points
- Lecture 3 - Bonus material: Perspective in visual art
- Lecture 4 - Understanding Points at Infinity
- Lecture 5 - The Extended Euclidean Plane
- Lecture 6 - Harmonic tetrads
- Lecture 7 - Perspective Drawing as a Perspectivity
- Lecture 8 - Perspectivities of the Extended Euclidean Plane
- Lecture 9 - Projectivities
- Lecture 10 - Projectivities as Functions on the Real Numbers
- Lecture 11 - Proving Pappus's Theorem
- Lecture 12 - The Fundamental Theorem of Projective Geometry
- Lecture 13 - The Cross Ratio
- Lecture 14 - Applications of the Cross Ratio
- Lecture 15 - The Real Projective Plane
- Lecture 16 - Transformations of the Real Projective Plane

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

NPTEL Video Course - Mathematics - NOC:Algebraic Combinatorics

Subject Co-ordinator - Prof. Amritanshu Prasad, Prof. Sankaran Viswanath

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Examples of Mobius Inversion
Lecture 2 - Partially Ordered Sets
Lecture 3 - Hasse Diagrams
Lecture 4 - Isomorphisms of Posets
Lecture 5 - Maximal, Minimal, Greatest, Least
Lecture 6 - Induced Subposets
Lecture 7 - Incidence Algebras
Lecture 8 - Inversion in Incidence Algebras
Lecture 9 - Mobius Inversion
Lecture 10 - Examples of Mobius Functions
Lecture 11 - Product Posets and their Mobius Functions
Lecture 12 - Opposite of a Poset
Lecture 13 - The Poset of Set Partitions
Lecture 14 - Connected Structures
Lecture 15 - Lattices
Lecture 16 - Weisner's Theorem
Lecture 17 - The Lattice of Non-Crossing Partitions
Lecture 18 - The Canonical Product Decomposition for Intervals of Non-Crossing Partitions
Lecture 19 - The Mobius Function for Non-Crossing Partitions
Lecture 20 - Ideals in a Poset
Lecture 21 - Mobius Function of $J(P)$
Lecture 22 - Young's Lattice
Lecture 23 - Distributive Lattices
Lecture 24 - Formal Power Series
Lecture 25 - The Necklace Problem
Lecture 26 - Combinatorial Classes
Lecture 27 - Sums, Products, and Sequences of Combinatorial Classes
Lecture 28 - Power Set, Multisets, and Sequences
Lecture 29 - A Little Dendrology

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- Lecture 30 - Super Catalan/Little Schroeder numbers
- Lecture 31 - Regular Languages
- Lecture 32 - Finite Automata
- Lecture 33 - The Pumping Lemma
- Lecture 34 - The Dyck Language
- Lecture 35 - Permutations and their cycles
- Lecture 36 - Permutation Groups
- Lecture 37 - Orbits, fixed points, stabilizers
- Lecture 38 - The orbit counting theorem
- Lecture 39 - The Polya Enumeration Theorem
- Lecture 40 - The Cycle Index Polynomials
- Lecture 41 - Cycle Index of the Octahedral Group
- Lecture 42 - Cycle Index of the Full Permutation Group
- Lecture 43 - Combinatorial Species
- Lecture 44 - Generating Series of a Species
- Lecture 45 - Cycle Index Series of a Species
- Lecture 46 - Isomorphism of Species
- Lecture 47 - Visualization of Species
- Lecture 48 - Sum of Species
- Lecture 49 - Product of Species
- Lecture 50 - Sums and Products: More Examples
- Lecture 51 - Substitution of Species
- Lecture 52 - Derivative of a Species
- Lecture 53 - Powers and Sequences of Binomial Type
- Lecture 54 - Pointing and Cayley's Theorem
- Lecture 55 - R-enriched Trees
- Lecture 56 - R-enriched Endofunctions
- Lecture 57 - Lagrange Inversion Formula
- Lecture 58 - Motivation for the LGV Lemma
- Lecture 59 - Statement of the LGV Lemma
- Lecture 60 - Nice Applications of the LGV Lemma
- Lecture 61 - Sign-Reversing Involutions
- Lecture 62 - Proof of the LGV Lemma
- Lecture 63 - The Cauchy-Binet Formula
- Lecture 64 - Symmetric polynomials: definition and examples
- Lecture 65 - Monomial symmetric polynomials
- Lecture 66 - Elementary and Complete symmetric polynomials - Part 1
- Lecture 67 - Elementary and Complete symmetric polynomials - Part 2
- Lecture 68 - Alternating polynomials

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- Lecture 69 - Labelled abaci and alternants
- Lecture 70 - Schur polynomials
- Lecture 71 - Pieri Rule - Statement and Examples
- Lecture 72 - Pieri Rule - Proof
- Lecture 73 - The second Pieri rule
- Lecture 74 - Semi-standard tableaux
- Lecture 75 - Triangularity of Kostka matrix
- Lecture 76 - Monomial expansion of Schur
- Lecture 77 - The RSK correspondence
- Lecture 78 - Jacobi Trudi identities via LGV lemma
- Lecture 79 - Formal ring of symmetric functions in infinitely many variables
- Lecture 80 - Monomial expansions and RSK
- Lecture 81 - Generating functions for e , h
- Lecture 82 - The power sum symmetric functions
- Lecture 83 - The inner product and Cauchy identity
- Lecture 84 - Skew Schur functions and the LR rule

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

NPTEL Video Course - Mathematics - NOC:An Invitation to Topology

Subject Co-ordinator - Prof. Indrava Roy

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to Topology

Lecture 2 - Basic Set theory

Lecture 3 - Mathematical Logic - Part 1

Lecture 4 - Mathematical Logic - Part 2

Lecture 5 - Functions

Lecture 6 - Finite Sets - Part 1

Lecture 7 - Finite Sets - Part 2

Lecture 8 - Infinite Sets

Lecture 9 - Infinite Sets and Axiom of Choice

Lecture 10 - Definition of aTopology

Lecture 11 - Examples of different topologies

Lecture 12 - Basis for a topology

Lecture 13 - Various topologies on the real line

Lecture 14 - Comparison of topologies - Part 1: Finer and coarser topologies

Lecture 15 - Comparison of topologies - Part 2: Comparing the various topologies on \mathbb{R}

Lecture 16 - Basis and Sub-basis for a topology

Lecture 17 - Various topologies: the subspace topology

Lecture 18 - The Product topology

Lecture 19 - Topologies on arbitrary Cartesian products

Lecture 20 - Metric topology - Part 1

Lecture 21 - Metric topology - Part 2

Lecture 22 - Metric topology - Part 3

Lecture 23 - Closed Sets

Lecture 24 - Closure and Limit points

Lecture 25 - Continuous functions

Lecture 26 - Construction of continuous functions

Lecture 27 - Continuous functions on metric spaces - Part 1

Lecture 28 - Continuous functions on metric spaces - Part 2

Lecture 29 - Connectedness

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

- Lecture 30 - Some conditions for Connectedness
- Lecture 31 - Connectedness of the Real Line
- Lecture 32 - Connectedness of a Linear Continuum
- Lecture 33 - The Intermediate Value Theorem
- Lecture 34 - Path-connectedness
- Lecture 35 - Connectedness does not imply Path-connectedness - Part 1
- Lecture 36 - Connectedness does not imply Path-connectedness - Part 2
- Lecture 37 - Connected and Path-connected Components
- Lecture 38 - Local connectedness and Local Path-connectedness
- Lecture 39 - Compactness
- Lecture 40 - Properties of compact spaces
- Lecture 41 - The Heine-Borel Theorem
- Lecture 42 - Tychonoff's theorem
- Lecture 43 - Proof of Tychonoff's theorem - Part 1
- Lecture 44 - Proof of Tychonoff's theorem - Part 2
- Lecture 45 - Compactness in metric spaces
- Lecture 46 - Lebesgue Number Lemma and the Uniform Continuity theorem
- Lecture 47 - Different Kinds of Compactness
- Lecture 48 - Equivalence of various compactness properties for Metric Spaces
- Lecture 49 - Compactness and Sequential Compactness in arbitrary topological spaces
- Lecture 50 - Baire Spaces
- Lecture 51 - Properties and Examples of Baire Spaces
- Lecture 52 - The Baire Category Theorem
- Lecture 53 - Complete Metric Spaces and the Baire Category theorem - Part 1
- Lecture 54 - Complete Metric Spaces and the Baire Category theorem - Part 2
- Lecture 55 - Application of the Baire Category theorem
- Lecture 56 - Regular and Normal spaces
- Lecture 57 - Properties and examples of regular and normal spaces
- Lecture 58 - Urysohn's Lemma
- Lecture 59 - Proof of Urysohn's Lemma
- Lecture 60 - Tietze Extension theorem - Part 1
- Lecture 61 - Tietze Extension theorem - Part 2
- Lecture 62 - Compactness and Completeness in Metric spaces
- Lecture 63 - The space of continuous functions - Part 1
- Lecture 64 - The space of continuous functions - Part 2
- Lecture 65 - Equicontinuity
- Lecture 66 - Total boundedness and Equicontinuity - Part 1
- Lecture 67 - Total boundedness and Equicontinuity - Part 2
- Lecture 68 - Topology of compact convergence - Part 1

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

- Lecture 69 - Topology of compact convergence - Part 2
- Lecture 70 - Equicontinuity revisited - Part 1
- Lecture 71 - Equicontinuity revisited - Part 2
- Lecture 72 - Locally compact Hausdorff spaces
- Lecture 73 - The Arzelà - Ascoli theorem

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

NPTEL Video Course - Mathematics - Discrete Mathematics

Subject Co-ordinator - Dr. Aditi Gangopadhyay, Dr. Sugata Gangopadhyay, Dr. Tanuja Srivastava

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to the theory of sets
- Lecture 2 - Set operation and laws of set operation
- Lecture 3 - The principle of inclusion and exclusion
- Lecture 4 - Application of the principle of inclusion and exclusion
- Lecture 5 - Fundamentals of logic
- Lecture 6 - Logical Inferences
- Lecture 7 - Methods of proof of an implication
- Lecture 8 - First order logic (1)
- Lecture 9 - First order logic (2)
- Lecture 10 - Rules of inference for quantified propositions
- Lecture 11 - Mathematical Induction (1)
- Lecture 12 - Mathematical Induction (2)
- Lecture 13 - Sample space, events
- Lecture 14 - Probability, conditional probability
- Lecture 15 - Independent events, Bayes theorem
- Lecture 16 - Information and mutual information
- Lecture 17 - Basic definition
- Lecture 18 - Isomorphism and sub graphs
- Lecture 19 - Walks, paths and circuits operations on graphs
- Lecture 20 - Euler graphs, Hamiltonian circuits
- Lecture 21 - Shortest path problem
- Lecture 22 - Planar graphs
- Lecture 23 - Basic definition
- Lecture 24 - Properties of relations
- Lecture 25 - Graph of relations
- Lecture 26 - Matrix of relation
- Lecture 27 - Closure of relation (1)
- Lecture 28 - Closure of relation (2)
- Lecture 29 - Warshall's algorithm

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

- Lecture 30 - Partially ordered relation
- Lecture 31 - Partially ordered sets
- Lecture 32 - Lattices
- Lecture 33 - Boolean algebra
- Lecture 34 - Boolean function (1)
- Lecture 35 - Boolean function (2)
- Lecture 36 - Discrete numeric function
- Lecture 37 - Generating function
- Lecture 38 - Introduction to recurrence relations
- Lecture 39 - Second order recurrence relation with constant coefficients (1)
- Lecture 40 - Second order recurrence relation with constant coefficients (2)
- Lecture 41 - Application of recurrence relation

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

NPTEL Video Course - Mathematics - NOC:Mathematical Methods and its Applications

Subject Co-ordinator - Prof. P.N. Agarwal, S. K. Gupta

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to linear differential equations
- Lecture 2 - Linear dependence, independence and Wronskian of functions
- Lecture 3 - Solution of second-order homogenous linear differential equations with constant coefficients - I
- Lecture 4 - Solution of second-order homogenous linear differential equations with constant coefficients - II
- Lecture 5 - Method of undetermined coefficients
- Lecture 6 - Methods for finding Particular Integral for second-order linear differential equations with constant coefficients
- Lecture 7 - Methods for finding Particular Integral for second-order linear differential equations with constant coefficients
- Lecture 8 - Methods for finding Particular Integral for second-order linear differential equations with constant coefficients
- Lecture 9 - Euler-Cauchy equations
- Lecture 10 - Method of reduction for second-order linear differential equations
- Lecture 11 - Method of variation of parameters
- Lecture 12 - Solution of second order differential equations by changing dependent variable
- Lecture 13 - Solution of second order differential equations by changing independent variable
- Lecture 14 - Solution of higher-order homogenous linear differential equations with constant coefficients
- Lecture 15 - Methods for finding Particular Integral for higher-order linear differential equations
- Lecture 16 - Formulation of Partial differential equations
- Lecture 17 - Solution of Lagrange's equation - I
- Lecture 18 - Solution of Lagrange's equation - II
- Lecture 19 - Solution of first order nonlinear equations - I
- Lecture 20 - Solution of first order nonlinear equations - II
- Lecture 21 - Solution of first order nonlinear equations - III
- Lecture 22 - Solution of first order nonlinear equations - IV
- Lecture 23 - Introduction to Laplace transforms
- Lecture 24 - Laplace transforms of some standard functions
- Lecture 25 - Existence theorem for Laplace transforms
- Lecture 26 - Properties of Laplace transforms - I
- Lecture 27 - Properties of Laplace transforms - II
- Lecture 28 - Properties of Laplace transforms - III
- Lecture 29 - Properties of Laplace transforms - IV

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- Lecture 30 - Convolution theorem for Laplace transforms - I
- Lecture 31 - Convolution theorem for Laplace transforms - II
- Lecture 32 - Initial and final value theorems for Laplace transforms
- Lecture 33 - Laplace transforms of periodic functions
- Lecture 34 - Laplace transforms of Heaviside unit step function
- Lecture 35 - Laplace transforms of Dirac delta function
- Lecture 36 - Applications of Laplace transforms - I
- Lecture 37 - Applications of Laplace transforms - II
- Lecture 38 - Applications of Laplace transforms - III
- Lecture 39 - Z⁻¹ transform and inverse Z-transform of elementary functions
- Lecture 40 - Properties of Z-transforms - I
- Lecture 41 - Properties of Z-transforms - II
- Lecture 42 - Initial and final value theorem for Z-transforms
- Lecture 43 - Convolution theorem for Z-transforms
- Lecture 44 - Applications of Z-transforms - I
- Lecture 45 - Applications of Z-transforms - II
- Lecture 46 - Applications of Z-transforms - III
- Lecture 47 - Fourier series and its convergence - I
- Lecture 48 - Fourier series and its convergence - II
- Lecture 49 - Fourier series of even and odd functions
- Lecture 50 - Fourier half-range series
- Lecture 51 - Parseval's Identity
- Lecture 52 - Complex form of Fourier series
- Lecture 53 - Fourier integrals
- Lecture 54 - Fourier sine and cosine integrals
- Lecture 55 - Fourier transforms
- Lecture 56 - Fourier sine and cosine transforms
- Lecture 57 - Convolution theorem for Fourier transforms
- Lecture 58 - Applications of Fourier transforms to BVP - I
- Lecture 59 - Applications of Fourier transforms to BVP - II
- Lecture 60 - Applications of Fourier transforms to BVP - III

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

NPTEL Video Course - Mathematics - NOC: Integral Equations, Calculus of Variations and its Applications

Subject Co-ordinator - Prof.D. N Pandey, Prof. P.N. Agarwal

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Definition and classification of linear integral equations
- Lecture 2 - Conversion of IVP into integral equations
- Lecture 3 - Conversion of BVP into an integral equations
- Lecture 4 - Conversion of integral equations into differential equations
- Lecture 5 - Integro-differential equations
- Lecture 6 - Fredholm integral equation with separable kernel
- Lecture 7 - Fredholm integral equation with separable kernel
- Lecture 8 - Solution of integral equations by successive substitutions
- Lecture 9 - Solution of integral equations by successive approximations
- Lecture 10 - Solution of integral equations by successive approximations
- Lecture 11 - Fredholm integral equations with symmetric kernels
- Lecture 12 - Fredholm integral equations with symmetric kernels
- Lecture 13 - Fredholm integral equations with symmetric kernels
- Lecture 14 - Construction of Green function - I
- Lecture 15 - Construction of Green function - II
- Lecture 16 - Green function for self adjoint linear differential equations
- Lecture 17 - Green function for non-homogeneous boundary value problem
- Lecture 18 - Fredholm alternative theorem - I
- Lecture 19 - Fredholm alternative theorem - II
- Lecture 20 - Fredholm method of solutions
- Lecture 21 - Classical Fredholm theory
- Lecture 22 - Classical Fredholm theory
- Lecture 23 - Classical Fredholm theory
- Lecture 24 - Method of successive approximations
- Lecture 25 - Neumann series and resolvent kernels - I
- Lecture 26 - Neumann series and resolvent kernels - II
- Lecture 27 - Equations with convolution type kernels - I
- Lecture 28 - Equations with convolution type kernels - II
- Lecture 29 - Singular integral equations - I

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- Lecture 30 - Singular integral equations - II
- Lecture 31 - Cauchy type integral equations - I
- Lecture 32 - Cauchy type integral equations - II
- Lecture 33 - Cauchy type integral equations - III
- Lecture 34 - Cauchy type integral equations - IV
- Lecture 35 - Cauchy type integral equations - V
- Lecture 36 - Solution of integral equations using Fourier transform
- Lecture 37 - Solution of integral equations using Hilbert transform - I
- Lecture 38 - Solution of integral equations using Hilbert transform - II
- Lecture 39 - Calculus of variations
- Lecture 40 - Calculus of variations
- Lecture 41 - Calculus of variations
- Lecture 42 - Calculus of variations
- Lecture 43 - Euler equation
- Lecture 44 - Euler equation
- Lecture 45 - Brachistochrone problem and Euler equation - I
- Lecture 46 - Euler's equation - II
- Lecture 47 - Functions of several independent variables
- Lecture 48 - Variational problems in parametric form
- Lecture 49 - Variational problems of general type
- Lecture 50 - Variational derivative and invariance of Euler's equation
- Lecture 51 - Invariance of Euler's equation and isoperimetric problem - I
- Lecture 52 - Isoperimetric problem - II
- Lecture 53 - Variational problem involving a conditional extremum - I
- Lecture 54 - Variational problem involving a conditional extremum - II
- Lecture 55 - Variational problems with moving boundaries - I
- Lecture 56 - Variational problems with moving boundaries - II
- Lecture 57 - Variational problems with moving boundaries - III
- Lecture 58 - Variational problems with moving boundaries; One sided variation
- Lecture 59 - Variational problem with a movable boundary for a functional dependent on two functions
- Lecture 60 - Hamilton's principle

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

NPTEL Video Course - Mathematics - NOC:Nonlinear Programming

Subject Co-ordinator - S. K. Gupta

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Convex Sets and Functions
- Lecture 2 - Properties of Convex Functions - I
- Lecture 3 - Properties of Convex Functions - II
- Lecture 4 - Properties of Convex Functions- III
- Lecture 5 - Convex Programming Problems
- Lecture 6 - KKT optimality conditions
- Lecture 7 - Quadratic Programming Problems - I
- Lecture 8 - Quadratic Programming Problems - II
- Lecture 9 - Separable Programming - I
- Lecture 10 - Separable Programming - II
- Lecture 11 - Geometric Programming - I
- Lecture 12 - Geometric Programming - II
- Lecture 13 - Geometric Programming - III
- Lecture 14 - Dynamic Programming - I
- Lecture 15 - Dynamic Programming - II
- Lecture 16 - Dynamic programming approach to find shortest path in any network
- Lecture 17 - Dynamic Programming - IV
- Lecture 18 - Search Techniques - I
- Lecture 19 - Search Techniques - II
- Lecture 20 - Search Techniques - III

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NPTEL Video Course - Mathematics - NOC:Numerical Methods

Subject Co-ordinator - Prof. Sanjeev Kumar, Prof. Ameeya Kumar Nayak

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to error analysis and linear systems
- Lecture 2 - Gaussian elimination with Partial pivoting
- Lecture 3 - LU decomposition
- Lecture 4 - Jacobi and Gauss Seidel methods
- Lecture 5 - Iterative methods-II
- Lecture 6 - Introduction to Non-linear equations and Bisection method
- Lecture 7 - Regula Falsi and Secant methods
- Lecture 8 - Newton-Raphson method
- Lecture 9 - Fixed point iteration method
- Lecture 10 - System of Nonlinear equations
- Lecture 11 - Introduction to Eigenvalues and Eigenvectors
- Lecture 12 - Similarity Transformations and Gershgorin Theorem
- Lecture 13 - Jacobi's Method for Computing Eigenvalues
- Lecture 14 - Power Method
- Lecture 15 - Inverse Power Method
- Lecture 16 - Interpolation - Part I (Introduction to Interpolation)
- Lecture 17 - Interpolation - Part II (Some basic operators and their properties)
- Lecture 18 - Interpolation - Part III (Newton's Forward/ Backward difference and derivation of general error formula)
- Lecture 19 - Interpolation - Part IV (Error in approximating a function by a polynomial using Newton's Forward difference formula)
- Lecture 20 - Interpolation - Part V (Solving problems using Newton's Forward and Backward difference formula)
- Lecture 21 - Interpolation - Part VI (Central difference formula)
- Lecture 22 - Interpolation - Part VII (Lagrange interpolation formula with examples)
- Lecture 23 - Interpolation - Part VIII (Divided difference interpolation with examples)
- Lecture 24 - Interpolation - Part IX (Hermite's interpolation with examples)
- Lecture 25 - Numerical differentiation - Part I (Introduction to numerical differentiation by interpolation formula)
- Lecture 26 - Numerical differentiation - Part II (Numerical differentiation based on Lagrange's interpolation formula)
- Lecture 27 - Numerical differentiation - Part III (Numerical differentiation based on Divided difference formula)
- Lecture 28 - Numerical differentiation - Part IV (Maxima and minima of a tabulated function and differentiation of a function)
- Lecture 29 - Numerical differentiation - Part V (Differentiation based on finite difference operators)

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- Lecture 30 - Numerical differentiation - Part VI (Method of undetermined coefficients and Derivatives with un
- Lecture 31 - Numerical Integration - Part I (Methodology of Numerical Integration and Rectangular rule)
- Lecture 32 - Numerical Integration - Part II (Quadrature formula and Trapezoidal rule with associated errors)
- Lecture 33 - Numerical Integration - Part III (Simpsons 1/3rd rule with associated errors)
- Lecture 34 - Numerical Integration - Part IV (Composite Simpsons 1/3rd rule and Simpsons 3/8th rule with exam
- Lecture 35 - Numerical Integration - Part V (Gauss Legendre 2-point and 3-point formula with examples)
- Lecture 36 - Introduction to Ordinary Differential equations
- Lecture 37 - Numerical methods for ODE-1
- Lecture 38 - Numerical Methods - II
- Lecture 39 - R-K Methods for solving ODEs
- Lecture 40 - Multi-step Method for solving ODEs

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

NPTEL Video Course - Mathematics - NOC:Numerical Linear Algebra

Subject Co-ordinator - Prof.D. N Pandey, Prof. P.N. Agrawal

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Matrix Operations and Types of Matrices
Lecture 2 - Determinant of a Matrix
Lecture 3 - Rank of a Matrix
Lecture 4 - Vector Space - I
Lecture 5 - Vector Space - II
Lecture 6 - Linear dependence and independence
Lecture 7 - Bases and Dimension - I
Lecture 8 - Bases and Dimension - II
Lecture 9 - Linear Transformation - I
Lecture 10 - Linear Transformation - II
Lecture 11 - Orthogonal Subspaces
Lecture 12 - Row Space, Column Space and Null Space
Lecture 13 - Eigen Values and Eigen Vectors - I
Lecture 14 - Eigen Values and Eigen Vectors - II
Lecture 15 - Diagonalizable Matrices
Lecture 16 - Orthogonal Sets
Lecture 17 - Gram Schmidt orthogonalization and orthogonal bases
Lecture 18 - Introduction to Matlab
Lecture 19 - Sign Integer Representation
Lecture 20 - Computer Representation of Numbers
Lecture 21 - Floating Point Representation
Lecture 22 - Round-off Error
Lecture 23 - Error Propagation in Computer Arithmetic
Lecture 24 - Addition and Multiplication of Floating Point Numbers
Lecture 25 - Conditioning and Condition Numbers - I
Lecture 26 - Conditioning and Condition Numbers - II
Lecture 27 - Stability of Numerical Algorithms - I
Lecture 28 - Stability of Numerical Algorithms - II
Lecture 29 - Vector Norms - I

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

- Lecture 30 - Vector Norms - II
- Lecture 31 - Matrix Norms - I
- Lecture 32 - Matrix Norms - II
- Lecture 33 - Convergent Matrices - I
- Lecture 34 - Convergent Matrices - II
- Lecture 35 - Stability of non linear system
- Lecture 36 - Condition number of a matrix
- Lecture 37 - Sensitivity Analysis - I
- Lecture 38 - Sensitivity Analysis - II
- Lecture 39 - Residual Theorem
- Lecture 40 - Nearness to Singularity
- Lecture 41 - Estimation of the Condition Number
- Lecture 42 - Singular value decomposition of a matrix - I
- Lecture 43 - Singular value decomposition of a matrix - II
- Lecture 44 - Orthonormal Projections
- Lecture 45 - Algebraic and geometric properties of SVD
- Lecture 46 - SVD and their applications
- Lecture 47 - Perturbation theorem for singular values
- Lecture 48 - Outer product expansion of a matrix
- Lecture 49 - Least square solutions - I
- Lecture 50 - Least square solutions - II
- Lecture 51 - Householder matrices
- Lecture 52 - Householder matrices and their applications
- Lecture 53 - Householder QR factorization - I
- Lecture 54 - Householder QR factorization - II
- Lecture 55 - Basic theorems on eigenvalues and QR method
- Lecture 56 - Power Method
- Lecture 57 - Rate of Convergence of Power Method
- Lecture 58 - Applications of Power Method with Shift
- Lecture 59 - Jacobi Method - I
- Lecture 60 - Jacobi Method - II

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

NPTEL Video Course - Mathematics - NOC:Numerical Methods - Finite Difference Approach

Subject Co-ordinator - Prof. Ameeya Kumar Nayak

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Introduction to Numerical solutions

Lecture 2 - Numerical Solution of ODE

Lecture 3 - Numerical solution of PDE

Lecture 4 - Finite difference approximation

Lecture 5 - Polynomial fitting and one-sided approximation

Lecture 6 - Solution of parabolic equation

Lecture 7 - Implicit and C-N scheme for solving 1D parabolic equation

Lecture 8 - Stability analysis of Explicit scheme for solving parabolic equation

Lecture 9 - Stability of Crank-Nicolson's scheme

Lecture 10 - Approximation of derivative boundary conditions

Lecture 11 - Solution of two-dimensional parabolic equation

Lecture 12 - Solution of 2D parabolic equation using ADI scheme

Lecture 13 - Solution of Elliptic Equation

Lecture 14 - Solution of Elliptic equation using SOR method

Lecture 15 - Solution of Elliptic equation using ADI scheme

Lecture 16 - Solution of Hyperbolic equation

Lecture 17 - Stability analysis for Hyperbolic equations

Lecture 18 - Characteristics of PDE

Lecture 19 - Lax-Wendroff's method

Lecture 20 - Wendroff's method

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

NPTEL Video Course - Mathematics - NOC:Multivariable Calculus

Subject Co-ordinator - Dr. Sanjeev Kumar, S. K. Gupta

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Functions of several variables
Lecture 2 - Limits for multivariable functions - I
Lecture 3 - Limits for multivariable functions - II
Lecture 4 - Continuity of multivariable functions
Lecture 5 - Partial Derivatives - I
Lecture 6 - Partial Derivatives - II
Lecture 7 - Differentiability - I
Lecture 8 - Differentiability - II
Lecture 9 - Chain rule - I
Lecture 10 - Chain rule - II
Lecture 11 - Change of variables
Lecture 12 - Euler's theorem for homogeneous functions
Lecture 13 - Tangent planes and Normal lines
Lecture 14 - Extreme values - I
Lecture 15 - Extreme values - II
Lecture 16 - Lagrange multipliers
Lecture 17 - Taylor's theorem
Lecture 18 - Error approximation
Lecture 19 - Polar-curves
Lecture 20 - Multiple Integrals
Lecture 21 - Change Of Order Of Integration
Lecture 22 - Change of Variables in Multiple Integral
Lecture 23 - Introduction to Gamma Function
Lecture 24 - Introduction to Beta Function
Lecture 25 - Properties of Beta and Gamma Functions - I
Lecture 26 - Properties of Beta and Gamma Functions - II
Lecture 27 - Dirichlet's Integral
Lecture 28 - Applications of Multiple Integrals
Lecture 29 - Vector Differentiation

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

- Lecture 30 - Gradient of a Scalar Field and Directional Derivative
- Lecture 31 - Normal Vector and Potential field
- Lecture 32 - Gradient (Identities), Divergence and Curl (Identities)
- Lecture 33 - Some Identities on Divergence and Curl
- Lecture 34 - Line Integral (I)
- Lecture 35 - Applications of Line Integrals
- Lecture 36 - Green's Theorem
- Lecture 37 - Surface Area
- Lecture 38 - Surface Integral
- Lecture 39 - Divergence Theorem of Gauss
- Lecture 40 - Stoke's Theorem

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

NPTEL Video Course - Mathematics - NOC:Ordinary and Partial Differential Equations and Applications

Subject Co-ordinator - Prof.D. N Pandey, Prof. P.N. Agrawal

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to differential equations - I
- Lecture 2 - Introduction to differential equations - II
- Lecture 3 - Existence and uniqueness of solutions of differential equations - I
- Lecture 4 - Existence and uniqueness of solutions of differential equations - II
- Lecture 5 - Existence and uniqueness of solutions of differential equations - III
- Lecture 6 - Existence and uniqueness of solutions of a system of differential equations
- Lecture 7 - Linear System
- Lecture 8 - Properties of Homogeneous Systems
- Lecture 9 - Solution of Homogeneous Linear System with Constant Coefficients - I
- Lecture 10 - Solution of Homogeneous Linear System with Constant Coefficients - II
- Lecture 11 - Solution of Homogeneous Linear System with Constant Coefficients - III
- Lecture 12 - Solution of Non-Homogeneous Linear System with Constant Coefficients
- Lecture 13 - Power Series
- Lecture 14 - Uniform Convergence of Power Series
- Lecture 15 - Power Series Solution of Second Order Homogeneous Equations
- Lecture 16 - Regular singular points - I
- Lecture 17 - Regular singular points - II
- Lecture 18 - Regular singular points - III
- Lecture 19 - Regular singular points - IV
- Lecture 20 - Regular singular points - V
- Lecture 21 - Critical points
- Lecture 22 - Stability of Linear Systems - I
- Lecture 23 - Stability of Linear Systems - II
- Lecture 24 - Stability of Linear Systems - III
- Lecture 25 - Critical Points and Paths of Non-linear Systems
- Lecture 26 - Boundary value problems for second order differential equations
- Lecture 27 - Self - adjoint Forms
- Lecture 28 - Sturm - Liouville problem and its properties
- Lecture 29 - Sturm - Liouville problem and its applications

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

- Lecture 30 - Green's function and its applications - I
- Lecture 31 - Green's function and its applications - II
- Lecture 32 - Origins and Classification of First Order PDE
- Lecture 33 - Initial Value Problem for Quasi-linear First Order Equations
- Lecture 34 - Existence and Uniqueness of Solutions
- Lecture 35 - Surfaces orthogonal to a given system of surfaces
- Lecture 36 - Nonlinear PDE of first order
- Lecture 37 - Cauchy method of characteristics - I
- Lecture 38 - Cauchy method of characteristics - II
- Lecture 39 - Compatible systems of first order equations
- Lecture 40 - Charpit's method - I
- Lecture 41 - Charpit's method - II
- Lecture 42 - Second Order PDE with Variable Coefficients
- Lecture 43 - Classification and Canonical Form of Second Order PDE - I
- Lecture 44 - Classification and Canonical Form of Second Order PDE - II
- Lecture 45 - Classification and Characteristic Curves of Second Order PDEs
- Lecture 46 - Review of Integral Transforms - I
- Lecture 47 - Review of Integral Transforms - II
- Lecture 48 - Review of Integral Transforms - II
- Lecture 49 - Review of Integral Transforms - III
- Lecture 50 - Laplace Equation - I
- Lecture 51 - Laplace Equation - II
- Lecture 52 - Laplace and Poisson Equations
- Lecture 53 - One dimensional wave equation and its solution - I
- Lecture 54 - One dimensional wave equation and its solution - II
- Lecture 55 - One dimensional wave equation and its solution - III
- Lecture 56 - Two dimensional wave equation and its solution - I
- Lecture 57 - Solution of non-homogeneous wave equation
- Lecture 58 - Solution of homogeneous diffusion equation - I
- Lecture 59 - Solution of homogeneous diffusion equation - II
- Lecture 60 - Duhamel's principle

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

NPTEL Video Course - Mathematics - NOC:Matrix Analysis with Applications

Subject Co-ordinator - Dr. Sanjeev Kumar, S. K. Gupta

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Elementary row operations
- Lecture 2 - Echelon form of a matrix
- Lecture 3 - Rank of a matrix
- Lecture 4 - System of Linear Equations - I
- Lecture 5 - System of Linear Equations - II
- Lecture 6 - Introduction to Vector Spaces
- Lecture 7 - Subspaces
- Lecture 8 - Basis and Dimension
- Lecture 9 - Linear Transformations
- Lecture 10 - Rank and Nullity
- Lecture 11 - Inverse of a Linear Transformation
- Lecture 12 - Matrix Associated with a LT
- Lecture 13 - Eigenvalues and Eigenvectors
- Lecture 14 - Cayley-Hamilton Theorem and Minimal Polynomial
- Lecture 15 - Diagonalization
- Lecture 16 - Special Matrices
- Lecture 17 - More on Special Matrices and Gerschgorin Theorem
- Lecture 18 - Inner Product Spaces
- Lecture 19 - Vector and Matrix Norms
- Lecture 20 - Gram Schmidt Process
- Lecture 21 - Normal Matrices
- Lecture 22 - Positive Definite Matrices
- Lecture 23 - Positive Definite and Quadratic Forms
- Lecture 24 - Gram Matrix and Minimization of Quadratic Forms
- Lecture 25 - Generalized Eigenvectors and Jordan Canonical Form
- Lecture 26 - Evaluation of Matrix Functions
- Lecture 27 - Least Square Approximation
- Lecture 28 - Singular Value Decomposition
- Lecture 29 - Pseudo-Inverse and SVD

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

- Lecture 30 - Introduction to Ill-Conditioned Systems
- Lecture 31 - Regularization of Ill-Conditioned Systems
- Lecture 32 - Linear Systems
- Lecture 33 - Linear Systems
- Lecture 34 - Non-Stationary Iterative Methods
- Lecture 35 - Non-Stationary Iterative Methods
- Lecture 36 - Krylov Subspace Iterative Methods (Conjugate Gradient Method)
- Lecture 37 - Krylov Subspace Iterative Methods (CG and Pre-Conditioning)
- Lecture 38 - Introduction to Positive Matrices
- Lecture 39 - Positive Matrices, Positive Eigenpair, Perron Root and vector, Example
- Lecture 40 - Polar Decomposition

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

NPTEL Video Course - Mathematics - NOC:Mathematical Modelling: Analysis and Applications

Subject Co-ordinator - Prof. Ameeya Kumar Nayak

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to Mathematical Modeling
- Lecture 2 - Discrete Time Linear Models in Population Dynamics - I
- Lecture 3 - Discrete Time Linear Models in Population Dynamics - II
- Lecture 4 - Discrete Time Linear Age Structured Models
- Lecture 5 - Numerical Methods to Compute Eigen Values
- Lecture 6 - Discrete Time Non-Linear Models in Population Dynamics - II
- Lecture 7 - Analysis on Logistic Difference Equation
- Lecture 8 - Classifications of Bifurcation
- Lecture 9 - Discrete Time Non - Linear Models in Population Dynamics - II
- Lecture 10 - Discrete Time Prey - Predator Model
- Lecture 11 - Introduction to Continuous Time Models
- Lecture 12 - Solution of First Order First Degree Differential Equations
- Lecture 13 - Continuous Time Models in Population Dynamics - I
- Lecture 14 - Continuous Time Models in Population Dynamics - II
- Lecture 15 - Stability and Linearization of System of Ordinary Differential Equations
- Lecture 16 - Continuous Time Single Species Models
- Lecture 17 - Qualitative Solution of Differential Equations - Phase Diagrams - I
- Lecture 18 - Qualitative Solution of Differential Equations - Phase Diagrams - II
- Lecture 19 - Continuous Time Lotka - Volterra Competition Model
- Lecture 20 - Continuous Time Prey - Predator Model

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

NPTEL Video Course - Mathematics - NOC:Dynamical System and Control

Subject Co-ordinator - Prof.D. N Pandey, Dr. N. Sukavanam

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Formulation of Dynamical Systems - I
Lecture 2 - Formulation of Dynamical Systems - II
Lecture 3 - Existence and Uniqueness Theorem - I
Lecture 4 - Existence and Uniqueness Theorem - II
Lecture 5 - Linear Systems - I
Lecture 6 - Linear Systems - II
Lecture 7 - Solutions of Linear Systems - I
Lecture 8 - Solutions of Linear Systems - II
Lecture 9 - Solutions of Linear Systems - III
Lecture 10 - Fundamental Matrix - I
Lecture 11 - Fundamental Matrix - II
Lecture 12 - Fundamental Matrix for Non-Autonomous systems
Lecture 13 - Solutions of Non-Homogeneous Systems
Lecture 14 - Stability of Systems
Lecture 15 - Stability of Linear Autonomous Systems - I
Lecture 16 - Stability of Linear Autonomous Systems - II
Lecture 17 - Stability of Linear Autonomous Systems - III
Lecture 18 - Stability of Weakly Non-Linear Systems - I
Lecture 19 - Stability of Weakly Non-Linear Systems - II
Lecture 20 - Stability of Non-Linear Systems using Linearization
Lecture 21 - Properties of Phase Portrait
Lecture 22 - Properties of Orbits
Lecture 23 - Phase Portrait
Lecture 24 - Phase Portrait of Linear Differential Equations - I
Lecture 25 - Phase Portrait of Linear Differential Equations - II
Lecture 26 - Phase Portrait of Linear Differential Equations - III
Lecture 27 - Poincare Bendixson Theorem
Lecture 28 - Limit Cycle
Lecture 29 - Lyapunov Stability - I

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NPTTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

- Lecture 30 - Lyapunov Stability - II
- Lecture 31 - Introduction to Control Systems - I
- Lecture 32 - Introduction to Control Systems - II
- Lecture 33 - Controllability of Autonomous Systems
- Lecture 34 - Controllability of Non-autonomous Systems
- Lecture 35 - Observability - I
- Lecture 36 - Observability - II
- Lecture 37 - Results on Controllability and Observability
- Lecture 38 - Companion Form
- Lecture 39 - Feedback Control - I
- Lecture 40 - Feedback Control - II
- Lecture 41 - Feedback Control - III
- Lecture 42 - Feedback Control - IV
- Lecture 43 - State Observer
- Lecture 44 - Stabilizability
- Lecture 45 - Introduction to Discrete Systems - I
- Lecture 46 - Introduction to Discrete Systems - II
- Lecture 47 - Lyapunov Stability Theory - I
- Lecture 48 - Lyapunov Stability Theory - II
- Lecture 49 - Lyapunov Stability Theory - III
- Lecture 50 - Optimal Control - I
- Lecture 51 - Optimal Control - II
- Lecture 52 - Optimal Control - III
- Lecture 53 - Optimal Control - IV
- Lecture 54 - Optimal Control for Discrete Systems - I
- Lecture 55 - Optimal Control for Discrete Systems - II
- Lecture 56 - Controllability of Discrete Systems
- Lecture 57 - Observability of Discrete Systems
- Lecture 58 - Stability for Discrete Systems
- Lecture 59 - Relation between Continuous and Discrete Systems - I
- Lecture 60 - Relation between Continuous and Discrete Systems - II

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

NPTEL Video Course - Mathematics - NOC:Advanced Engineering Mathematics

Subject Co-ordinator - Prof. P.N. Agarwal

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Analytic Function

Lecture 2 - Cauchy-Riemann Equations

Lecture 3 - Harmonic Functions, Harmonic Conjugates and Milne's Method

Lecture 4 - Applications to the Problems of Potential Flow - I

Lecture 5 - Applications to the Problems of Potential Flow - II

Lecture 6 - Complex Integration

Lecture 7 - Cauchy's Theorem - I

Lecture 8 - Cauchy's Theorem - II

Lecture 9 - Cauchy's Integral Formula for the Derivatives of Analytic Function

Lecture 10 - Morera's Theorem, Liouville's Theorem and Fundamental Theorem of Algebra

Lecture 11 - Winding Number and Maximum Modulus Principle

Lecture 12 - Sequences and Series

Lecture 13 - Uniform Convergence of Series

Lecture 14 - Power Series

Lecture 15 - Taylor Series

Lecture 16 - Laurent Series

Lecture 17 - Zeros and Singularities of an Analytic Function

Lecture 18 - Residue at a Singularity

Lecture 19 - Residue Theorem

Lecture 20 - Meromorphic Functions

Lecture 21 - Evaluation of real integrals using residues - I

Lecture 22 - Evaluation of real integrals using residues - II

Lecture 23 - Evaluation of real integrals using residues - III

Lecture 24 - Evaluation of real integrals using residues - IV

Lecture 25 - Evaluation of real integrals using residues - V

Lecture 26 - Bilinear Transformations

Lecture 27 - Cross Ratio

Lecture 28 - Conformal Mapping - I

Lecture 29 - Conformal Mapping - II

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

- Lecture 30 - Conformal mapping from half plane to disk and half plane to half plane - I
- Lecture 31 - Conformal mapping from disk to disk and angular region to disk
- Lecture 32 - Application of Conformal Mapping to Potential Theory
- Lecture 33 - Review of Z-transforms - I
- Lecture 34 - Review of Z-transforms - II
- Lecture 35 - Review of Z-transforms - III
- Lecture 36 - Review of Bilateral Z-transforms
- Lecture 37 - Finite Fourier Transforms
- Lecture 38 - Fourier Integral and Fourier Transforms
- Lecture 39 - Fourier Series
- Lecture 40 - Discrete Fourier Transforms - I
- Lecture 41 - Discrete Fourier Transforms - II
- Lecture 42 - Basic Concepts of Probability
- Lecture 43 - Conditional Probability
- Lecture 44 - Bayes Theorem and Probability Networks
- Lecture 45 - Discrete Probability Distribution
- Lecture 46 - Binomial Distribution
- Lecture 47 - Negative Binomial Distribution and Poisson Distribution
- Lecture 48 - Continuous Probability Distribution
- Lecture 49 - Poisson Process
- Lecture 50 - Exponential Distribution
- Lecture 51 - Normal Distribution
- Lecture 52 - Joint Probability Distribution - I
- Lecture 53 - Joint Probability Distribution - II
- Lecture 54 - Joint Probability Distribution - III
- Lecture 55 - Correlation and Regression - I
- Lecture 56 - Correlation and Regression - II
- Lecture 57 - Testing of Hypotheses - I
- Lecture 58 - Testing of Hypotheses - II
- Lecture 59 - Testing of Hypotheses - III
- Lecture 60 - Application to Queuing Theory and Reliability Theory

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

NPTEL Video Course - Mathematics - NOC:Higher Engineering Mathematics

Subject Co-ordinator - Prof. P.N. Agarwal

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Symbolic Representation of Statements - I
Lecture 2 - Symbolic Representation of Statements - II
Lecture 3 - Tautologies and Contradictions
Lecture 4 - Predicates and Quantifiers - I
Lecture 5 - Predicates and Quantifiers - II
Lecture 6 - Validity of Arguments
Lecture 7 - Language and Grammars - I
Lecture 8 - Language and Grammars - II
Lecture 9 - Language and Grammars - III
Lecture 10 - Finite- State Machines
Lecture 11 - Partially Ordered Sets - I
Lecture 12 - Partially Ordered Sets - II
Lecture 13 - Partially Ordered Sets - III
Lecture 14 - Lattices - I
Lecture 15 - Lattices - II
Lecture 16 - Lattices - III
Lecture 17 - Lattices - IV
Lecture 18 - Lattices - V
Lecture 19 - Boolean Algebra - I
Lecture 20 - Boolean Algebra - II
Lecture 21 - Boolean Algebra - III
Lecture 22 - Boolean Algebra - IV
Lecture 23 - Logic Gates
Lecture 24 - Karnaugh Map - I
Lecture 25 - Karnaugh Map - II
Lecture 26 - Various type of Graphs - I
Lecture 27 - Various types of Graphs - II
Lecture 28 - Paths and Connectivity
Lecture 29 - Subgraphs and Traversable Multigraphs

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- Lecture 30 - Undirected and Directed Graphs
- Lecture 31 - Eulerian and Hamiltonian Graphs
- Lecture 32 - Planar Graphs
- Lecture 33 - Representation of Graphs
- Lecture 34 - Isomorphic and Homeomorphic Graphs
- Lecture 35 - Kuratowski's Theorem
- Lecture 36 - Dual of a Graph
- Lecture 37 - Coloring of Graphs - I
- Lecture 38 - Coloring of Graphs - II
- Lecture 39 - Tree - I
- Lecture 40 - Tree - II
- Lecture 41 - Graphical Method - I
- Lecture 42 - Graphical Method - II
- Lecture 43 - General Linear Programming Problem
- Lecture 44 - Simplex Method - I
- Lecture 45 - Simplex Method - II
- Lecture 46 - Big - M Method - I
- Lecture 47 - Big - M Method - II (Special Cases)
- Lecture 48 - Two Phase Method - I
- Lecture 49 - Two Phase method - II
- Lecture 50 - Duality - I
- Lecture 51 - Duality - II
- Lecture 52 - Dual Simplex Method
- Lecture 53 - Transportation Problem - I
- Lecture 54 - Transportation Problem - II
- Lecture 55 - Assignment Problem - I
- Lecture 56 - Assignment Problem - II

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

NPTEL Video Course - Mathematics - NOC:Operations Research

Subject Co-ordinator - Prof. Kusumdeep

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Introduction to OR Models
Lecture 2 - More OR Models
Lecture 3 - Graphical Method for LPP
Lecture 4 - Convex sets
Lecture 5 - Simplex Method
Lecture 6 - Big M Method
Lecture 7 - Two Phase
Lecture 8 - Multiple solutions of LPP
Lecture 9 - Unbounded solution of LPP
Lecture 10 - Infeasible solution of LPP
Lecture 11 - Revised Simplex Method
Lecture 12 - Case studies and Exercises - I
Lecture 13 - Case studies and Exercises - II
Lecture 14 - Case studies and Exercises - III
Lecture 15 - Primal Dual Construction
Lecture 16 - Weak Duality Theorem
Lecture 17 - More Duality Theorems
Lecture 18 - Primal-Dual relationship of solutions
Lecture 19 - Dual Simplex Method
Lecture 20 - Sensitivity Analysis - I
Lecture 21 - Sensitivity Analysis - II
Lecture 22 - Case studies and Exercises - I
Lecture 23 - Case studies and Exercises - II
Lecture 24 - Integer Programming
Lecture 25 - Goal Programming
Lecture 26 - Multi-Objective Programming
Lecture 27 - Dynamic Programming
Lecture 28 - Transportation Problem
Lecture 29 - Assignment Problem

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

- Lecture 30 - Case studies and Exercises
- Lecture 31 - Processing n Jobs on Two Machines
- Lecture 32 - Processing n Jobs through Three Machines
- Lecture 33 - Processing two jobs through m machines
- Lecture 34 - Processing n jobs through m machines
- Lecture 35 - Case studies and Exercises
- Lecture 36 - Two Person Zero-Sum Game
- Lecture 37 - Theorems of Game Theory
- Lecture 38 - Solution of Mixed Strategy Games
- Lecture 39 - Linear Programming method for solving games
- Lecture 40 - Case studies and Exercises

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

NPTEL Video Course - Mathematics - NOC:Essential Mathematics for Machine Learning

Subject Co-ordinator - Prof. S.K. Gupta, Dr. Sanjeev Kumar

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Vectors in Machine Learning
- Lecture 2 - Basics of Matrix Algebra
- Lecture 3 - Vector Space: Definition and Examples
- Lecture 4 - Vector Subspace: Examples and Properties
- Lecture 5 - Basis and Dimension
- Lecture 6 - Linear Transformations
- Lecture 7 - Norms and Spaces
- Lecture 8 - Orthogonal Complement and Projection Mapping
- Lecture 9 - Eigenvalues and Eigenvectors
- Lecture 10 - Special matrices and Properties
- Lecture 11 - Spectral Decomposition
- Lecture 12 - Singular Value Decomposition
- Lecture 13 - SVD: Properties and Applications
- Lecture 14 - Low Rank Approximations
- Lecture 15 - Python Implementation of SVD and Low - rank Approximation
- Lecture 16 - Principal Component Analysis - I
- Lecture 17 - PCA: Derivation and Examples
- Lecture 18 - Python Implementation of PCA
- Lecture 19 - Linear Discriminant Analysis
- Lecture 20 - Python Implementation of LDA
- Lecture 21 - Least Square Approximation and Minimum Normed Solution
- Lecture 22 - Linear and Multiple Regression - I
- Lecture 23 - Linear and Multiple Regression - II
- Lecture 24 - Logistic Regression - I
- Lecture 25 - Logistic Regression - II
- Lecture 26 - Classification Metrics
- Lecture 27 - Gram Schmidt Process
- Lecture 28 - Polar Decomposition
- Lecture 29 - Minimal Polynomial and Jordan Canonical Form - I

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- Lecture 30 - Minimal Polynomial and Jordan Canonical Form - II
- Lecture 31 - Basic Concepts of Calculus - I
- Lecture 32 - Basic Concepts of Calculus - II
- Lecture 33 - Basic Concepts of Calculus - III
- Lecture 34 - Basic Concepts of Calculus - IV
- Lecture 35 - Basic Concepts of Calculus - V
- Lecture 36 - Calculus in Python
- Lecture 37 - Convex Sets and Functions
- Lecture 38 - Properties of convex functions - I
- Lecture 39 - Properties of Convex functions - II
- Lecture 40 - Introduction to Optimization
- Lecture 41 - Unconstrained Optimization
- Lecture 42 - Constrained Optimization - I
- Lecture 43 - Constrained Optimization - II
- Lecture 44 - Steepest Descent method
- Lecture 45 - Newton's and Penalty function method
- Lecture 46 - Optimization using Python
- Lecture 47 - Operations on Sets
- Lecture 48 - Review on Probability
- Lecture 49 - Bayes' theorem and Random variables
- Lecture 50 - Expectation and Variance
- Lecture 51 - Discrete probability distributions
- Lecture 52 - Continuous probability distributions
- Lecture 53 - Joint probability distribution and covariance
- Lecture 54 - Introduction to SVM
- Lecture 55 - Error Minimizing LPP
- Lecture 56 - Concepts of Duality
- Lecture 57 - Hard Margin classifier
- Lecture 58 - Soft margin classifier
- Lecture 59 - SVM using Python - I
- Lecture 60 - SVM using Python - II

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

NPTEL Video Course - Mathematics - Advanced Matrix Theory and Linear Algebra for Engineers

Subject Co-ordinator - Prof. Vittal Rao

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Prologue - Part 1
Lecture 2 - Prologue - Part 2
Lecture 3 - Prologue - Part 3
Lecture 4 - Linear Systems - Part 1
Lecture 5 - Linear Systems - Part 2
Lecture 6 - Linear Systems - Part 3
Lecture 7 - Linear Systems - Part 4
Lecture 8 - Vector Spaces - Part 1
Lecture 9 - Vector Spaces - Part 2
Lecture 10 - Linear Independence and Subspaces - Part 1
Lecture 11 - Linear Independence and Subspaces - Part 2
Lecture 12 - Linear Independence and Subspaces - Part 3
Lecture 13 - Linear Independence and Subspaces - Part 4
Lecture 14 - Basis - Part 1
Lecture 15 - Basis - Part 2
Lecture 16 - Basis - Part 3
Lecture 17 - Linear Transformations - Part 1
Lecture 18 - Linear Transformations - Part 2
Lecture 19 - Linear Transformations - Part 3
Lecture 20 - Linear Transformations - Part 4
Lecture 21 - Linear Transformations - Part 5
Lecture 22 - Inner Product and Orthogonality - Part 1
Lecture 23 - Inner Product and Orthogonality - Part 2
Lecture 24 - Inner Product and Orthogonality - Part 3
Lecture 25 - Inner Product and Orthogonality - Part 4
Lecture 26 - Inner Product and Orthogonality - Part 5
Lecture 27 - Inner Product and Orthogonality - Part 6
Lecture 28 - Diagonalization - Part 1
Lecture 29 - Diagonalization - Part 2

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

- Lecture 30 - Diagonalization - Part 3
- Lecture 31 - Diagonalization - Part 4
- Lecture 32 - Hermitian and Symmetric matrices - Part 1
- Lecture 33 - Hermitian and Symmetric matrices - Part 2
- Lecture 34 - Hermitian and Symmetric matrices - Part 3
- Lecture 35 - Hermitian and Symmetric matrices - Part 4
- Lecture 36 - Singular Value Decomposition (SVD) - Part 1
- Lecture 37 - Singular Value Decomposition (SVD) - Part 2
- Lecture 38 - Back To Linear Systems - Part 1
- Lecture 39 - Back To Linear Systems - Part 2
- Lecture 40 - Epilogue

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

NPTEL Video Course - Mathematics - Ordinary Differential Equations and Applications

Subject Co-ordinator - Prof. A.K. Nandakumaran, Prof. Raju K. George, Prof. P.S. Datti

Co-ordinating Institute - IISc - Bangalore | IIST - Trivandrum | TIFR-CAM - Bangalore

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

Lecture 1 - General Introduction

Lecture 2 - Examples

Lecture 3 - Examples (Continued - I)

Lecture 4 - Examples (Continued - II)

Lecture 5 - Linear Algebra

Lecture 6 - Linear Algebra (Continued - I)

Lecture 7 - Linear Algebra (Continued - II)

Lecture 8 - Analysis

Lecture 9 - Analysis (Continued...)

Lecture 10 - First Order Linear Equations

Lecture 11 - Exact Equations

Lecture 12 - Second Order Linear Equations

Lecture 13 - Second Order Linear Equations (Continued - I)

Lecture 14 - Second Order Linear Equations (Continued - II)

Lecture 15 - Well-posedness and Examples of IVP

Lecture 16 - Gronwall's Lemma

Lecture 17 - Basic Lemma and Uniqueness Theorem

Lecture 18 - Picard's Existence and Uniqueness Theorem

Lecture 19 - Picard's Existence and Uniqueness (Continued...)

Lecture 20 - Cauchy Peano Existence Theorem

Lecture 21 - Existence using Fixed Point Theorem

Lecture 22 - Continuation of Solutions

Lecture 23 - Series Solution

Lecture 24 - General System and Diagonalizability

Lecture 25 - 2 by 2 systems and Phase Plane Analysis

Lecture 26 - 2 by 2 systems and Phase Plane Analysis (Continued...)

Lecture 27 - General Systems

Lecture 28 - General Systems (Continued...) and Non-homogeneous Systems

Lecture 29 - Basic Definitions and Examples

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

- Lecture 30 - Stability Equilibrium Points
- Lecture 31 - Stability Equilibrium Points (Continued - I)
- Lecture 32 - Stability Equilibrium Points (Continued - II)
- Lecture 33 - Second Order Linear Equations (Continued - III)
- Lecture 34 - Lyapunov Function
- Lecture 35 - Lyapunov Function (Continued...)
- Lecture 36 - Periodic Orbits and Poincare Bendixon Theory
- Lecture 37 - Periodic Orbits and Poincare Bendixon Theory (Continued...)
- Lecture 38 - Linear Second Order Equations
- Lecture 39 - General Second Order Equations
- Lecture 40 - General Second Order Equations (Continued...)

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

NPTEL Video Course - Mathematics - NOC:Linear Algebra

Subject Co-ordinator - Prof. Dilip P. Patil

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction to Algebraic Structures - Rings and Fields
Lecture 2 - Definition of Vector Spaces
Lecture 3 - Examples of Vector Spaces
Lecture 4 - Definition of subspaces
Lecture 5 - Examples of subspaces
Lecture 6 - Examples of subspaces (Continued...)
Lecture 7 - Sum of subspaces
Lecture 8 - System of linear equations
Lecture 9 - Gauss elimination
Lecture 10 - Generating system, linear independence and bases
Lecture 11 - Examples of a basis of a vector space
Lecture 12 - Review of univariate polynomials
Lecture 13 - Examples of univariate polynomials and rational functions
Lecture 14 - More examples of a basis of vector spaces
Lecture 15 - Vector spaces with finite generating system
Lecture 16 - Steinitz's exchange theorem and examples
Lecture 17 - Examples of finite dimensional vector spaces
Lecture 18 - Dimension formula and its examples
Lecture 19 - Existence of a basis
Lecture 20 - Existence of a basis (Continued...)
Lecture 21 - Existence of a basis (Continued...)
Lecture 22 - Introduction to Linear Maps
Lecture 23 - Examples of Linear Maps
Lecture 24 - Linear Maps and Bases
Lecture 25 - Pigeonhole principle in Linear Algebra
Lecture 26 - Interpolation and the rank theorem
Lecture 27 - Examples
Lecture 28 - Direct sums of vector spaces
Lecture 29 - Projections

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- Lecture 30 - Direct sum decomposition of a vector space
- Lecture 31 - Dimension equality and examples
- Lecture 32 - Dual spaces
- Lecture 33 - Dual spaces (Continued...)
- Lecture 34 - Quotient spaces
- Lecture 35 - Homomorphism theorem of vector spaces
- Lecture 36 - Isomorphism theorem of vector spaces
- Lecture 37 - Matrix of a linear map
- Lecture 38 - Matrix of a linear map (Continued...)
- Lecture 39 - Matrix of a linear map (Continued...)
- Lecture 40 - Change of bases
- Lecture 41 - Computational rules for matrices
- Lecture 42 - Rank of a matrix
- Lecture 43 - Computation of the rank of a matrix
- Lecture 44 - Elementary matrices
- Lecture 45 - Elementary operations on matrices
- Lecture 46 - LR decomposition
- Lecture 47 - Elementary Divisor Theorem
- Lecture 48 - Permutation groups
- Lecture 49 - Canonical cycle decomposition of permutations
- Lecture 50 - Signature of a permutation
- Lecture 51 - Introduction to multilinear maps
- Lecture 52 - Multilinear maps (Continued...)
- Lecture 53 - Introduction to determinants
- Lecture 54 - Determinants (Continued...)
- Lecture 55 - Computational rules for determinants
- Lecture 56 - Properties of determinants and adjoint of a matrix
- Lecture 57 - Adjoint-determinant theorem
- Lecture 58 - The determinant of a linear operator
- Lecture 59 - Determinants and Volumes
- Lecture 60 - Determinants and Volumes (Continued...)

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NPTEL Video Course - Mathematics - NOC:An Introduction to Smooth Manifolds

Subject Co-ordinator - Prof. Harish Seshadri

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Basic linear algebra
Lecture 2 - Multivariable calculus - 1
Lecture 3 - Multivariable calculus - 2
Lecture 4 - The derivative map
Lecture 5 - Inverse Function Theorem
Lecture 6 - Constant Rank Theorem
Lecture 7 - Smooth functions with compact support
Lecture 8 - Smooth manifold
Lecture 9 - Examples of smooth manifolds
Lecture 10 - Higher dimensional spheres as smooth manifolds
Lecture 11 - Smooth maps
Lecture 12 - Examples of smooth maps
Lecture 13 - Tangent spaces - 1
Lecture 14 - Tangent spaces - 2
Lecture 15 - Derivatives of smooth maps
Lecture 16 - Chain rule on manifolds
Lecture 17 - Dimension of tangent space - 1
Lecture 18 - Dimension of tangent space - 2
Lecture 19 - Derivative of inclusion map
Lecture 20 - Basis of tangent space
Lecture 21 - Inverse Function Theorem for manifolds
Lecture 22 - Submanifolds
Lecture 23 - Tangent space of a submanifold
Lecture 24 - Regular Value Theorem
Lecture 25 - Special linear group as a submanifold of the set of all square matrices
Lecture 26 - Hypersurfaces
Lecture 27 - Tangent spaces to level sets
Lecture 28 - Vector fields - 1
Lecture 29 - Vector fields - 2

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- Lecture 30 - Vector fields - 3
- Lecture 31 - Lie groups - 1
- Lecture 32 - Lie groups - 2
- Lecture 33 - Integral curve and flows - 1
- Lecture 34 - Integral curve and flows - 2
- Lecture 35 - Integral curve and flows - 3
- Lecture 36 - Complete vector fields
- Lecture 37 - Vector fields and smooth maps
- Lecture 38 - Lie Brackets - 1
- Lecture 39 - Lie brackets - 2
- Lecture 40 - Lie brackets - 3
- Lecture 41 - Lie algebras of matrix groups - 1
- Lecture 42 - Lie algebras of matrix groups - 2
- Lecture 43 - Exponential map
- Lecture 44 - Frobenius theorems
- Lecture 45 - Tensors and differential forms - 1
- Lecture 46 - Tensors and differential forms - 2
- Lecture 47 - Pull-back form
- Lecture 48 - Symmetric Tensors
- Lecture 49 - Alternating Tensors - 1
- Lecture 50 - Alternating Tensors - 2
- Lecture 51 - Alternating Tensors - 3
- Lecture 52 - Alternating Tensors - 4
- Lecture 53 - Alternating Tensors - 5
- Lecture 54 - Alternating Tensors - 6
- Lecture 55 - Alternating Tensors - 7
- Lecture 56 - Alternating Tensors - 8
- Lecture 57 - Alternating Tensors - 9
- Lecture 58 - Differential forms on manifolds - 1
- Lecture 59 - Differential forms on manifolds - 2
- Lecture 60 - The Exterior derivative - 1
- Lecture 61 - The Exterior derivative - 2
- Lecture 62 - The Exterior derivative - 3
- Lecture 63 - The Exterior derivative - 4
- Lecture 64 - The Exterior derivative - 5
- Lecture 65 - Special classes of forms
- Lecture 66 - Orientation on manifolds - 1
- Lecture 67 - Orientation on manifolds - 2
- Lecture 68 - Orientation on manifolds - 3

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

NPTEL Video Course - Mathematics - NOC:Measure Theory (Prof. E. K. Narayanan)

Subject Co-ordinator - Prof. E. K. Narayanan

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Review of Riemann integration and introduction to sigma algebras

Lecture 2 - Sigma algebras and measurability

Lecture 3 - Measurable functions and approximation by simple functions

Lecture 4 - Properties of countably additive measures

Lecture 5 - Integration of positive measurable functions

Lecture 6 - Some properties of integrals of positive simple functions

Lecture 7 - Monotone convergence theorem and Fatou's lemma

Lecture 8 - Integration of complex valued measurable functions

Lecture 9 - Dominated convergence theorem

Lecture 10 - Sets of measure zero and completion

Lecture 11 - Consequences of MCT, Fatou's lemma and DCT

Lecture 12 - Rectangles in \mathbb{R}^n and some properties

Lecture 13 - Outer measure on \mathbb{R}^n

Lecture 14 - Properties of outer measure on \mathbb{R}^n

Lecture 15 - Lebesgue measurable sets and Lebesgue measure on \mathbb{R}^n

Lecture 16 - Lebesgue sigma algebra

Lecture 17 - Lebesgue measure

Lecture 18 - Fine properties of measurable sets

Lecture 19 - Invariance properties of Lebesgue measure

Lecture 20 - Non measurable set

Lecture 21 - Measurable functions

Lecture 22 - Riemann and Lebesgue integrals

Lecture 23 - Locally compact Hausdorff spaces

Lecture 24 - Riesz representation theorem

Lecture 25 - Positive Borel measures

Lecture 26 - Lebesgue measure via Riesz representation theorem

Lecture 27 - Construction of Lebesgue measure

Lecture 28 - Invariance properties of Lebesgue measure

Lecture 29 - Linear transformations and Lebesgue measure

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NPTTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

- Lecture 30 - Cantor set
- Lecture 31 - Cantor function
- Lecture 32 - Lebesgue set which is not Borel
- Lecture 33 - L^p spaces
- Lecture 34 - L^p norm
- Lecture 35 - Completeness of L^p
- Lecture 36 - Properties of L^p spaces
- Lecture 37 - Examples of L^p spaces
- Lecture 38 - Product sigma algebra
- Lecture 39 - Product measures - I
- Lecture 40 - Product measures - II
- Lecture 41 - Fubini's theorem - I
- Lecture 42 - Fubini's theorem - II
- Lecture 43 - Completeness of product measures
- Lecture 44 - Polar coordinates
- Lecture 45 - Applications of Fubini's theorem
- Lecture 46 - Complex measures - I
- Lecture 47 - Complex measures - II
- Lecture 48 - Absolutely continuous measures
- Lecture 49 - L^2 space
- Lecture 50 - Continuous linear functionals
- Lecture 51 - Radon-Nikodym theorem - I
- Lecture 52 - Radon Nikodym theorem - II
- Lecture 53 - Consequences of Radon-Nikodym theorem - I
- Lecture 54 - Consequences of Radon-Nikodym theorem - II
- Lecture 55 - Continuous linear functionals on L^p spaces - I
- Lecture 56 - Continuous linear functionals on L^p spaces - II
- Lecture 57 - Riesz representation theorem - I
- Lecture 58 - Riesz representation theorem - II
- Lecture 59 - Hardy-Littlewood maximal function
- Lecture 60 - Lebesgue differentiation theorem
- Lecture 61 - Absolutely continuous functions - I
- Lecture 62 - Absolutely continuous functions - II

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

NPTEL Video Course - Mathematics - NOC:Introduction to Algebraic Geometry and Commutative Algebra

Subject Co-ordinator - Prof. Dilip P. Patil

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Motivation for K-algebraic sets
- Lecture 2 - Definitions and examples of Affine Algebraic Set
- Lecture 3 - Rings and Ideals
- Lecture 4 - Operation on Ideals
- Lecture 5 - Prime Ideals and Maximal Ideals
- Lecture 6 - Krull's Theorem and consequences
- Lecture 7 - Module, submodules and quotient modules
- Lecture 8 - Algebras and polynomial algebras
- Lecture 9 - Universal property of polynomial algebra and examples
- Lecture 10 - Finite and Finite type algebras
- Lecture 11 - K-Spectrum (K-rational points)
- Lecture 12 - Identity theorem for Polynomial functions
- Lecture 13 - Basic properties of K-algebraic sets
- Lecture 14 - Examples of K-algebraic sets
- Lecture 15 - K-Zariski Topology
- Lecture 16 - The map $V \rightarrow L$
- Lecture 17 - Noetherian and Artinian Ordered sets
- Lecture 18 - Noetherian induction and Transfinite induction
- Lecture 19 - Modules with Chain Conditions
- Lecture 20 - Properties of Noetherian and Artinian Modules
- Lecture 21 - Examples of Artinian and Noetherian Modules
- Lecture 22 - Finite modules over Noetherian Rings
- Lecture 23 - Hilbert's Basis Theorem (HBT)
- Lecture 24 - Consequences of HBT
- Lecture 25 - Free Modules and rank
- Lecture 26 - More on Noetherian and Artinian modules
- Lecture 27 - Ring of Fractions (Localization)
- Lecture 28 - Nil radical, contraction of ideals
- Lecture 29 - Universal property of $S^{-1}A$

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- Lecture 30 - Ideal structure in $S^{-1}A$
- Lecture 31 - Consequences of the Correspondence of Ideals
- Lecture 32 - Consequences of the Correspondence of Ideals (Continued...)
- Lecture 33 - Modules of Fraction and universal properties
- Lecture 34 - Exactness of the functor S^{-1}
- Lecture 35 - Universal property of Modules of Fractions
- Lecture 36 - Further properties of Modules and Module of Fractions
- Lecture 37 - Local-Global Principle
- Lecture 38 - Consequences of Local-Global Principle
- Lecture 39 - Properties of Artinian Rings
- Lecture 40 - Krull-Nakayama Lemma
- Lecture 41 - Properties of I, K and V, L maps
- Lecture 42 - Hilbert's Nullstellensatz
- Lecture 43 - Hilbert's Nullstellensatz (Continued...)
- Lecture 44 - Proof of Zariski's Lemma (HNS 3)
- Lecture 45 - Consequences of HNS
- Lecture 46 - Consequences of HNS (Continued...)
- Lecture 47 - Jacobson Ring and examples
- Lecture 48 - Irreducible subsets of Zariski Topology (Finite type K -algebra)
- Lecture 49 - Spec functor on Finite type K -algebras
- Lecture 50 - Properties of Irreducible topological spaces
- Lecture 51 - Zariski Topology on arbitrary commutative rings
- Lecture 52 - Spec functor on arbitrary commutative rings
- Lecture 53 - Topological properties of $\text{Spec } A$
- Lecture 54 - Example to support the term Spectrum
- Lecture 55 - Integral Extensions
- Lecture 56 - Elementwise characterization of Integral extensions
- Lecture 57 - Properties and examples of Integral extensions
- Lecture 58 - Prime and Maximal ideals in integral extensions
- Lecture 59 - Lying over Theorem
- Lecture 60 - Cohen-Siegelberg Theorem

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NPTEL Video Course - Mathematics - NOC:First Course on Partial Differential Equations-I

Subject Co-ordinator - Prof. P. S. Datti, Prof. A. K. Nandakumaran

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction - 1
Lecture 2 - Introduction - 2
Lecture 3 - Priliminaries - 1
Lecture 4 - Priliminaries - 2
Lecture 5 - Priliminaries - 3
Lecture 6 - Priliminaries - 4
Lecture 7 - First order equations in two variables - 1
Lecture 8 - First order equations in two variables - 2
Lecture 9 - First order equations in two variables - 3
Lecture 10 - First order equations in two variables - 4
Lecture 11 - First order equations in two variables - 5
Lecture 12 - First order equations in more than two variables - 6
Lecture 13 - First order equations in more than two variables - 7
Lecture 14 - First order equations in more than two variables - 8
Lecture 15 - Classification - 1
Lecture 16 - Classification - 2
Lecture 17 - Classification - 3
Lecture 18 - Laplace and Poisson equations - 1
Lecture 19 - Laplace and Poisson equations - 2
Lecture 20 - Laplace and Poisson equations - 3
Lecture 21 - Laplace and Poisson equations - 4
Lecture 22 - Laplace and Poisson equations - 5
Lecture 23 - Laplace and Poisson equations - 6
Lecture 24 - Laplace and Poisson equations - 7
Lecture 25 - Laplace and Poisson equations - 8
Lecture 26 - Laplace and Poisson equations - 9
Lecture 27 - Laplace and Poisson equations - 10
Lecture 28 - One dimensional heat equation - 1
Lecture 29 - One dimensional heat equation - 2

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Lecture 30	- One dimensional heat equation	- 3
Lecture 31	- One dimensional heat equation	- 4
Lecture 32	- One dimensional heat equation	- 5
Lecture 33	- One dimensional heat equation	- 6
Lecture 34	- One dimensional wave equation	- 1
Lecture 35	- One dimensional wave equation	- 2
Lecture 36	- One dimensional wave equation	- 3
Lecture 37	- One dimensional wave equation	- 4
Lecture 38	- One dimensional wave equation	- 5
Lecture 39	- One dimensional wave equation	- 6
Lecture 40	- One dimensional wave equation	- 7
Lecture 41	- One dimensional wave equation	- 8

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NPTEL Video Course - Mathematics - NOC:First Course on Partial Differential Equations - II

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

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction
Lecture 2 - HJE 1
Lecture 3 - HJE 2
Lecture 4 - HJE 3
Lecture 5 - HJE 4
Lecture 6 - HJE 5
Lecture 7 - HJE 6
Lecture 8 - CL1
Lecture 9 - CL2
Lecture 10 - CL3
Lecture 11 - CL4
Lecture 12 - CL5
Lecture 13 - CL6
Lecture 14 - Perron Method - 1
Lecture 15 - Perron Method - 2
Lecture 16 - Perron Method - 3
Lecture 17 - Perron Method - 4
Lecture 18 - Newtonian Potential - 1
Lecture 19 - Newtonian Potential - 2
Lecture 20 - Newtonian Potential - 3
Lecture 21 - Newtonian Potential - 4
Lecture 22 - Newtonian Potential - 5
Lecture 23 - Eigen Value Problem - 1
Lecture 24 - Eigen Value Problem - 2
Lecture 25 - Heat Equation - 1
Lecture 26 - Heat Equation - 2
Lecture 27 - Heat Equation - 3
Lecture 28 - Heat Equation - 4
Lecture 29 - Heat Equation - 5

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Lecture 30 - Wave Equation - 1
Lecture 31 - Wave Equation - 2
Lecture 32 - Wave Equation - 3
Lecture 33 - Wave Equation - 4
Lecture 34 - Wave Equation - 5
Lecture 35 - Wave Equation - 6
Lecture 36 - Wave Equation - 7
Lecture 37 - Weak Solutions - 1
Lecture 38 - Weak Solutions - 2
Lecture 39 - Weak Solutions - 3
Lecture 40 - Weak Solutions - 4
Lecture 41 - Weak Solutions - 5

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

NPTEL Video Course - Mathematics - Matrix Theory

Subject Co-ordinator - Prof. Chandra Murthy

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Course introduction and properties of matrices

Lecture 2 - Vector spaces

Lecture 3 - Basis, dimension

Lecture 4 - Linear transforms

Lecture 5 - Fundamental subspaces of a matrix

Lecture 6 - Fundamental theorem of linear algebra

Lecture 7 - Properties of rank

Lecture 8 - Inner product

Lecture 9 - Gram-schmidt algorithm

Lecture 10 - Orthonormal matrices definition

Lecture 11 - Determinant

Lecture 12 - Properties of determinants

Lecture 13 - Introduction to norms and inner products

Lecture 14 - Vector norms and their properties

Lecture 15 - Applications and equivalence of vector norms

Lecture 16 - Summary of equivalence of norms

Lecture 17 - Dual norms

Lecture 18 - Properties and examples of dual norms

Lecture 19 - Matrix norms

Lecture 20 - Matrix norms: Properties

Lecture 21 - Induced norms

Lecture 22 - Induced norms and examples

Lecture 23 - Spectral radius

Lecture 24 - Properties of spectral radius

Lecture 25 - Convergent matrices, Banach lemma

Lecture 26 - Recap of matrix norms and Levy-Desplanques theorem

Lecture 27 - Equivalence of matrix norms and error in inverses of linear systems

Lecture 28 - Errors in inverses of matrices

Lecture 29 - Errors in solving systems of linear equations

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- Lecture 30 - Introduction to eigenvalues and eigenvectors
- Lecture 31 - The characteristic polynomial
- Lecture 32 - Solving characteristic polynomials, eigenvectors properties
- Lecture 33 - Similarity
- Lecture 34 - Diagonalization
- Lecture 35 - Relationship between eigenvalues of BA and AB
- Lecture 36 - Eigenvector and principle of biorthogonality
- Lecture 37 - Unitary matrices
- Lecture 38 - Properties of unitary matrices
- Lecture 39 - Unitary equivalence
- Lecture 40 - Schur's triangularization theorem
- Lecture 41 - Cayley-Hamilton theorem
- Lecture 42 - Uses of cayley-hamilton theorem and diagonalizability revisited
- Lecture 43 - Normal matrices: Definition and fundamental properties
- Lecture 44 - Fundamental properties of normal matrices
- Lecture 45 - QR decomposition and canonical forms
- Lecture 46 - Jordan canonical form
- Lecture 47 - Determining the Jordan form of a matrix
- Lecture 48 - Properties of the Jordan canonical form - Part 1
- Lecture 49 - Properties of the Jordan canonical form - Part 2
- Lecture 50 - Properties of convergent matrices
- Lecture 51 - Polynomials and matrices
- Lecture 52 - Other canonical forms and factorization of matrices: Gaussian elimination and LU factorization
- Lecture 53 - LU decomposition
- Lecture 54 - LU decomposition with pivoting
- Lecture 55 - Solving pivoted system and LDM decomposition
- Lecture 56 - Cholesky decomposition and uses
- Lecture 57 - Hermitian and symmetric matrix
- Lecture 58 - Properties of hermitian matrices
- Lecture 59 - Variational characterization of Eigenvalues: Rayleigh-Ritz theorem
- Lecture 60 - Variational characterization of eigenvalues (Continued...)
- Lecture 61 - Courant-Fischer theorem
- Lecture 62 - Summary of Rayliegh-Ritz and Courant-Fischer theorems
- Lecture 63 - Weyl's theorem
- Lecture 64 - Positive semi-definite matrix, monotonicity theorem and interlacing theorems
- Lecture 65 - Interlacing theorem - I
- Lecture 66 - Interlacing theorem - II (Converse)
- Lecture 67 - Interlacing theorem (Continued...)
- Lecture 68 - Eigenvalues: Majorization theorem and proof

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- Lecture 69 - Location and perturbation of Eigenvalues - Part 1: Dominant diagonal theorem
- Lecture 70 - Location and perturbation of Eigenvalues - Part 2: Gersgorin's theorem
- Lecture 71 - Implications of Gersgorin disc theorem, condition of eigenvalues
- Lecture 72 - Condition of eigenvalues for diagonalizable matrices
- Lecture 73 - Perturbation of eigenvalues Birkhoff's theorem Hoffman-Weiland theorem
- Lecture 74 - Singular value definition and some remarks
- Lecture 75 - Proof of singular value decomposition theorem
- Lecture 76 - Partitioning the SVD
- Lecture 77 - Properties of SVD
- Lecture 78 - Generalized inverse of matrices
- Lecture 79 - Least squares
- Lecture 80 - Constrained least squares