

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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- 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