

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

NPTEL Video Course - Mechanical Engineering - NOC:Optimization from Fundamentals

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Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction
Lecture 2 - Isoperimetric problem
Lecture 3 - Review of real analysis (sequences and convergence)
Lecture 4 - Bolzano-Weierstrass theorem and completeness axiom
Lecture 5 - Open sets, closed sets and compact sets
Lecture 6 - Continuity and Weierstrass theorem
Lecture 7 - Weierstrass theorem
Lecture 8 - Different solution concepts
Lecture 9 - Different types of constraints
Lecture 10 - Taylor's theorem
Lecture 11 - First order sufficient condition
Lecture 12 - Second order necessary condition
Lecture 13 - Least square regression
Lecture 14 - Least square regression (Continued...)
Lecture 15 - Implicit function theorem
Lecture 16 - Optimization with equality constraints and introduction to Lagrange multipliers - I
Lecture 17 - Optimization with equality constraints and introduction to Lagrange multipliers - II
Lecture 18 - Least norm solution of underdetermined linear system
Lecture 19 - Transformation of optimization problems - I
Lecture 20 - Transformation of optimization problems - II
Lecture 21 - Transformation of optimization problems - III
Lecture 22 - Convex Analysis - I
Lecture 23 - Convex Analysis - II
Lecture 24 - Convex Analysis - III
Lecture 25 - Polyhedrons
Lecture 26 - Minkowski-Weyl Theorem
Lecture 27 - Linear Programming Problems
Lecture 28 - Extreme points and optimal solution of an LP
Lecture 29 - Extreme points and optimal solution of an LP (Continued...)

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- Lecture 30 - Extreme points and basic feasible solutions
- Lecture 31 - Equivalence of extreme point and BFS
- Lecture 32 - Equivalence of extreme point and BFS (Continued...)
- Lecture 33 - Examples of Linear Programming
- Lecture 34 - Weak and Strong duality
- Lecture 35 - Proof of strong duality
- Lecture 36 - Proof of strong duality (Continued...)
- Lecture 37 - Farkas' lemma
- Lecture 38 - Max-flow Min-cut problem
- Lecture 39 - Shortest path problem
- Lecture 40 - Complementary Slackness
- Lecture 41 - Proof of complementary slackness
- Lecture 42 - Tangent cones
- Lecture 43 - Tangent cones (Continued...)
- Lecture 44 - Constraint qualifications, Farkas' lemma and KKT
- Lecture 45 - KKT conditions
- Lecture 46 - Convex optimization and KKT conditions
- Lecture 47 - Slater condition and Lagrangian Dual
- Lecture 48 - Weak duality in convex optimization and Fenchel dual
- Lecture 49 - Geometry of the Lagrangian
- Lecture 50 - Strong duality in convex optimization - I
- Lecture 51 - Strong duality in convex optimization - II
- Lecture 52 - Strong duality in convex optimization - III
- Lecture 53 - Line search methods for unconstrained optimization
- Lecture 54 - Wolfe conditions
- Lecture 55 - Line search algorithm and convergence
- Lecture 56 - Steepest descent method and rate of convergence
- Lecture 57 - Newton's method
- Lecture 58 - Penalty methods
- Lecture 59 - L1 and L2 Penalty methods
- Lecture 60 - Augmented Lagrangian methods
- Lecture 61 - Cutting plane methods
- Lecture 62 - Interior point methods for linear programming
- Lecture 63 - Dynamic programming: Inventory control problem
- Lecture 64 - Policy and value function
- Lecture 65 - Principle of optimality in dynamic programming
- Lecture 66 - Principle of optimality applied to inventory control problem
- Lecture 67 - Optimal control for a system with linear state dynamics and quadratic cost