

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Phase Field Modelling: The Materials Science, Math

Subject Co-ordinator - Dr. M.P. Gururajan

Co-ordinating Institute - IIT - Bombay

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

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

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Lecture 30 - Module 5
Lecture 31 - Module 5
Lecture 32 - Module 6
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Lecture 67 - Module 14
Lecture 68 - Module 14

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Lecture 71 - Module 16
Lecture 72 - Module 16
Lecture 73 - Module 16
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Lecture 75 - Module 17
Lecture 76 - Module 17
Lecture 77 - Module 18
Lecture 78 - Module 18
Lecture 79 - Module 18
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Lecture 83 - Module 20
Lecture 84 - Module 20
Lecture 85 - Module 21
Lecture 86 - Module 21
Lecture 87 - Module 22

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Dealing with Materials Data: Collection, Analysis

Subject Co-ordinator - Dr. M.P. Gururajan

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Descriptive Statistics - I
Lecture 2 - Descriptive Statistics - II
Lecture 3 - Probability and Distribution
Lecture 4 - Random variable and Expectation - I
Lecture 5 - Random variable and Expectation - II
Lecture 6 - Random variable and Expectation - III
Lecture 7 - Random variable and Expectation - IV
Lecture 8 - Module
Lecture 9 - R
Lecture 10 - R as calculator and plotter
Lecture 11 - R as calculator and plotter
Lecture 12 - Data in tabular form
Lecture 13 - Tabular data in R
Lecture 14 - Dataframe in R
Lecture 15 - R libraries for plotting
Lecture 16 - Importing and plotting data
Lecture 17 - Property charts
Lecture 18 - Introduction to R
Lecture 19 - Descriptive statistics
Lecture 20 - Presenting experimental results
Lecture 21 - Property based reports, errors, significant digits
Lecture 22 - Dealing with distributions
Lecture 23 - Grain size data
Lecture 24 - Case study
Lecture 25 - Grain size in a two phase steel
Lecture 26 - Presenting experimental results
Lecture 27 - Errors and their propagation
Lecture 28 - Fitting experimental data to distributions
Lecture 29 - Combining uncertainties

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- Lecture 30 - Summary
- Lecture 31 - Special Random Variables - I
- Lecture 32 - Special Random Variables - II
- Lecture 33 - Special Random Variables - III
- Lecture 34 - Special Random Variables - IV
- Lecture 35 - Special Random Variables - V
- Lecture 36 - Probabilty Plots
- Lecture 37 - Probability distributions
- Lecture 38 - Properties of probability distributions
- Lecture 39 - Bernoulli trials and binomial distributions
- Lecture 40 - Atom probe technique and negative binomial distribution
- Lecture 41 - Atom probe and hypergeometric distribution
- Lecture 42 - Atom probe
- Lecture 43 - Nucleation and Poisson distribution
- Lecture 44 - Normal distribution
- Lecture 45 - Normal distribution and error function
- Lecture 46 - Probability scale
- Lecture 47 - Sampling Distribution - I
- Lecture 48 - Sampling Distribution - II
- Lecture 49 - Sampling Distribution - III
- Lecture 50 - Parameter Estimation - I
- Lecture 51 - Parameter Estimator - II
- Lecture 52 - Parameter Estimator - III
- Lecture 53 - Parameter Estimator - IV
- Lecture 54 - Bayesian Estimation
- Lecture 55 - Log normal distribution
- Lecture 56 - Lorentz/Cauchy distribution
- Lecture 57 - Lifetime and exponential distributions
- Lecture 58 - Distributions from statistical mechanics
- Lecture 59 - Uniform distribution and summary of probability distributions
- Lecture 60 - Data processing
- Lecture 61 - Distribution function of a data series
- Lecture 62 - Estimating mean and mean-square-deviation of data
- Lecture 63 - Data with unequal weights
- Lecture 64 - Robust estimates
- Lecture 65 - From data to underlying distribution
- Lecture 66 - Bootstrap method
- Lecture 67 - Summary
- Lecture 68 - Hypothesis Testing - I

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- Lecture 69 - Hypothesis Testing - II
- Lecture 70 - Hypothesis Testing - III
- Lecture 71 - Hypothesis Testing - IV
- Lecture 72 - Hypothesis Testing - V
- Lecture 73 - Hypothesis Testing - VI
- Lecture 74 - Graphical handling of data
- Lecture 75 - Fitting and graphical handling of data
- Lecture 76 - Data transformable to linear
- Lecture 77 - Data of known functional form
- Lecture 78 - Calibration, Fitting, Hypotheses testing
- Lecture 79 - Analysis of variance
- Lecture 80 - Summary
- Lecture 81 - Regression Analysis - I
- Lecture 82 - Regression Analysis - II
- Lecture 83 - Regression Analysis - III
- Lecture 84 - Regression Analysis - IV
- Lecture 85 - Analysis of Variance - I
- Lecture 86 - Analysis of Variance - II
- Lecture 87 - Design of Experiment - I
- Lecture 88 - Design of Experiment - II
- Lecture 89 - Design of Experiment - III
- Lecture 90 - Design of Experiment - IV
- Lecture 91 - Summary of the course
- Lecture 92 - Case studies
- Lecture 93 - Case study 1
- Lecture 94 - Case study 1
- Lecture 95 - Case study 2
- Lecture 96 - Case study 3
- Lecture 97 - Case study 4
- Lecture 98 - Case study 5
- Lecture 99 - Course summary

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Aqueous Corrosion and its Control

Subject Co-ordinator - Prof. V. S. Raja

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction to the course and corrosion implications

Lecture 2 - Can we predict if a metal corrodes? - Part I

Lecture 3 - Can we predict if a metal corrodes? - Part II

Lecture 4 - Can we calculate the rate of corrosion

Lecture 5 - Can we calculate the rate of corrosion

Lecture 6 - Can we calculate the corrosion rate of metals

Lecture 7 - Passivity (Continued...)

Lecture 8 - DC polarisation experiments and their relation to mixed potential theory/Evans diagram

Lecture 9 - Pourbaix diagram and electrochemical corrosion

Lecture 10 - Forms of corrosion

Lecture 11 - Forms of corrosion

Lecture 12 - Forms of corrosion

Lecture 13 - Forms of corrosion

Lecture 14 - Forms of corrosion

Lecture 15 - Forms of corrosion

Lecture 16 - Forms of corrosion

Lecture 17 - Forms of corrosion

Lecture 18 - Forms of corrosion

Lecture 19 - Forms of corrosion

Lecture 20 - Forms of corrosion

Lecture 21 - Forms of corrosion

Lecture 22 - Forms of corrosion

Lecture 23 - Forms of corrosion

Lecture 24 - Forms of corrosion

Lecture 25 - Forms of corrosion

Lecture 26 - Forms of corrosion

Lecture 27 - Forms of corrosion

Lecture 28 - Forms of corrosion

Lecture 29 - Forms of corrosion

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- Lecture 30 - Forms of corrosion
- Lecture 31 - Forms of corrosion
- Lecture 32 - Forms of corrosion
- Lecture 33 - Forms of corrosion
- Lecture 34 - Effective corrosion management

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Cathodic Protection Engineering

Subject Co-ordinator - Prof. V.S. Raja

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction to the course and understanding corrosion

Lecture 2 - External corrosion of pipelines

Lecture 3 - Electrochemical principles

Lecture 4 - Criteria

Lecture 5 - Assessment of pipeline condition through surveys - Part I

Lecture 6 - Assessment of pipeline condition through surveys - Part II

Lecture 7 - Anode ground bed for cathodic protection

Lecture 8 - Perspectives in storage tanks and off-shore structures

Lecture 9 - Anodes

Lecture 10 - Worked out examples

Lecture 11 - Stray current corrosion and its control

Lecture 12 - Coatings and rectifier selection

Lecture 13 - Internal corrosion of oil and steel gas pipelines

Lecture 14 - Anodic protection engineering

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NPTEL Video Course - Metallurgy and Material Science - NOC:Introduction to Materials Science and Engineering

Subject Co-ordinator - Prof. Rajesh Prasad

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction
- Lecture 2 - Crystal geometry
- Lecture 3 - Unit cell
- Lecture 4 - Classification of lattices
- Lecture 5 - Gaps in Bravais lattice list
- Lecture 6 - Symmetry - I
- Lecture 7 - Symmetry - II
- Lecture 8 - Classification of lattices on the basis of symmetry
- Lecture 9 - A symmetry based approach to Bravais lattices
- Lecture 10 - Miller indices of directions
- Lecture 11 - Miller indices for planes
- Lecture 12 - Miller indices for plane and its normal in Cubic Crystal
- Lecture 13 - Weiss Zone law and its applications
- Lecture 14 - Inter-planar spacing
- Lecture 15 - Bragg's Law
- Lecture 16 - Close-packing of hard spheres
- Lecture 17 - Hexagonal Close-Packed (HCP) structure
- Lecture 18 - Lattice and motif of HCP crystals
- Lecture 19 - c/a ratio of an ideal HCP crystal
- Lecture 20 - ABCABC stacking of close-packed spheres
- Lecture 21 - Voids in close-packed structures
- Lecture 22 - Solid solutions - I
- Lecture 23 - Solid solutions - II
- Lecture 24 - Hume-Rothery rules
- Lecture 25 - Ordered and disordered solid solutions
- Lecture 26 - Graphene
- Lecture 27 - Structure of graphite
- Lecture 28 - Structure of diamond
- Lecture 29 - Carbon nanotubes (CNT)

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- Lecture 30 - Buckminsterfullerene (C60)
- Lecture 31 - Ionic solids
- Lecture 32 - NaCl
- Lecture 33 - CsCl
- Lecture 34 - ZnS
- Lecture 35 - BCC vs CsCl
- Lecture 36 - Amorphous Solids
- Lecture 37 - Polymers
- Lecture 38 - Vinyl Polymers
- Lecture 39 - Thermoplasts and Thermosets
- Lecture 40 - Tacticity
- Lecture 41 - Copolymers
- Lecture 42 - Crystallinity in Polymers
- Lecture 43 - Defects in Crystals
- Lecture 44 - Vacancies
- Lecture 45 - Edge dislocation
- Lecture 46 - Edge dislocation
- Lecture 47 - Characteristic vectors of a dislocation
- Lecture 48 - Edge, screw and mixed dislocations
- Lecture 49 - Screw dislocations
- Lecture 50 - Burgers circuit
- Lecture 51 - Elastic energy of a dislocation line
- Lecture 52 - Burgers vector
- Lecture 53 - Burgers vector of a dislocation is constant along the line
- Lecture 54 - Geometrical properties of a dislocations
- Lecture 55 - Dislocation cannot end abruptly in a crystal
- Lecture 56 - Dislocation cannot end abruptly in a crystal
- Lecture 57 - Dislocation cannot end abruptly in a crystal
- Lecture 58 - Dislocation motion
- Lecture 59 - 2D defects
- Lecture 60 - Free surface or external surface of the crystal
- Lecture 61 - Stacking faults
- Lecture 62 - Twin boundary
- Lecture 63 - Grain boundary
- Lecture 64 - Small angle symmetric tilt boundary
- Lecture 65 - Ball bearing model
- Lecture 66 - Phase diagrams
- Lecture 67 - Phases and components
- Lecture 68 - Uses of phase diagrams

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- Lecture 69 - Phases present in the system
- Lecture 70 - Composition of phases present in the system
- Lecture 71 - Proportion of phases present in the system
- Lecture 72 - Microstructure evolution during solidification in isomorphous systems
- Lecture 73 - Eutectic system
- Lecture 74 - Eutectic reaction
- Lecture 75 - Eutectic, hypoeutectic and hypereutectic alloys
- Lecture 76 - Gibbs's phase rule
- Lecture 77 - Fe-C phase diagram
- Lecture 78 - Eutectoid, hypoeutectoid and hypereutectoid steels
- Lecture 79 - Microstructure of a hypoeutectoid steel
- Lecture 80 - Microstructure of a hypereutectoid steel
- Lecture 81 - Diffusion
- Lecture 82 - Fick's first law
- Lecture 83 - Fick's second law
- Lecture 84 - Error function solution of Fick's second law
- Lecture 85 - Atomic mechanisms of diffusion
- Lecture 86 - Substitutional diffusion revisited
- Lecture 87 - Diffusion paths
- Lecture 88 - Steady and unsteady state diffusion
- Lecture 89 - Phase Transformation
- Lecture 90 - Nucleation
- Lecture 91 - Nucleation and capillary rise
- Lecture 92 - Nucleation, growth and overall transformation
- Lecture 93 - Time-temperature-transformation (TTT) diagram
- Lecture 94 - Homogeneous and heterogeneous nucleation
- Lecture 95 - Heat treatment of steels
- Lecture 96 - TTT diagram of Eutectoid Steels
- Lecture 97 - Quenching and martensite
- Lecture 98 - Austempering and bainite
- Lecture 99 - Tempering
- Lecture 100 - Residual stresses and Quench cracks
- Lecture 101 - Marquenching and martempering
- Lecture 102 - TTT diagram of hypoeutectoid and hypereutectoid steels
- Lecture 103 - TTT diagram of alloy steel
- Lecture 104 - hardenability of steels
- Lecture 105 - Glass Ceramics
- Lecture 106 - Tensile test
- Lecture 107 - Plastic deformation and crystal structure

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- Lecture 108 - Shape change
- Lecture 109 - Slip
- Lecture 110 - Resolved shear stress
- Lecture 111 - CRSS
- Lecture 112 - Schmid's law
- Lecture 113 - CRSS
- Lecture 114 - Why is experimental CRSS less than theoretical CRSS
- Lecture 115 - Strengthening mechanisms
- Lecture 116 - Dislocation density
- Lecture 117 - Frank-Read source
- Lecture 118 - strain hardening
- Lecture 119 - Dislocation interaction leading to strain hardening - I
- Lecture 120 - Dislocation interaction leading to strain hardening - II
- Lecture 121 - Solid solution hardening
- Lecture 122 - Grain size hardening
- Lecture 123 - Age hardening - I
- Lecture 124 - Age hardening - II
- Lecture 125 - Metastable precipitates
- Lecture 126 - Annealing of cold-worked metals
- Lecture 127 - Recovery
- Lecture 128 - Recrystallization
- Lecture 129 - Grain Growth
- Lecture 130 - True stress and true strain
- Lecture 131 - Creep
- Lecture 132 - Effect of stress and temperature on creep
- Lecture 133 - Creep Mechanisms
- Lecture 134 - Composites
- Lecture 135 - Isostrain modulus
- Lecture 136 - Isostress modulus
- Lecture 137 - Fracture
- Lecture 138 - Ductile and Brittle Fracture
- Lecture 139 - Role of crack size
- Lecture 140 - Griffith's Criterion
- Lecture 141 - Stress Concentration
- Lecture 142 - Ductile to brittle transition
- Lecture 143 - Enhancing fracture resistance
- Lecture 144 - Toughening of glass
- Lecture 145 - Toughening of glass
- Lecture 146 - Fatigue

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Lecture 147 - Sub-Critical crack growth

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Introduction to Crystal Elasticity and Crystal Pla

Subject Co-ordinator - Prof. Swarup bag

Co-ordinating Institute - IIT - Guwahati

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

- Lecture 1 - Structure and properties of materials - Part I
- Lecture 2 - Structure and properties of materials - Part II
- Lecture 3 - Elasticity Isotropic elasticity of materials; Anisotropic elasticity - Part I
- Lecture 4 - Elasticity Isotropic elasticity of materials; Anisotropic elasticity - Part II
- Lecture 5 - Continuum Plasticity - I (Part A)
- Lecture 6 - Continuum Plasticity - I (Part B)
- Lecture 7 - Continuum Plasticity - II (Part A)
- Lecture 8 - Continuum Plasticity - II (Part B)
- Lecture 9 - Crystal Plasticity - I (Part A)
- Lecture 10 - Crystal Plasticity - I (Part B)
- Lecture 11 - Crystal Plasticity - II (Part A)
- Lecture 12 - Crystal Plasticity - II (Part B)
- Lecture 13 - Crystal Plasticity - II (Part C)
- Lecture 14 - Hardening Mechanisms in Metals - Part I
- Lecture 15 - Hardening Mechanisms in Metals - Part II
- Lecture 16 - Hardening Mechanisms in Metals - Part III
- Lecture 17 - Multi-Scale Approach to Materials Modelling

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

NPTEL Video Course - Metallurgy and Material Science - Advanced Characterization Techniques

Subject Co-ordinator - Dr. Krishanu Biswas, Prof.N.P.Gurao

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Advanced Characterization Techniques
Lecture 2 - Advanced Characterization Techniques
Lecture 3 - Advanced Characterization Techniques
Lecture 4 - Advanced Characterization Techniques
Lecture 5 - Advanced Characterization Techniques
Lecture 6 - Advanced Characterization Techniques
Lecture 7 - Advanced Characterization Techniques
Lecture 8 - Advanced Characterization Techniques
Lecture 9 - Advanced Characterization Techniques
Lecture 10 - Advanced Characterization Techniques
Lecture 11 - Advanced Characterization Techniques
Lecture 12 - Advanced Characterization Techniques
Lecture 13 - Advanced Characterization Techniques
Lecture 14 - Advanced Characterization Techniques
Lecture 15 - Advanced Characterization Techniques
Lecture 16 - Advanced Characterization Techniques
Lecture 17 - Advanced Characterization Techniques
Lecture 18 - Advanced Characterization Techniques
Lecture 19 - Advanced Characterization Techniques
Lecture 20 - Advanced Characterization Techniques
Lecture 21 - Advanced Characterization Techniques
Lecture 22 - Advanced Characterization Techniques
Lecture 23 - Advanced Characterization Techniques
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Lecture 29 - Advanced Characterization Techniques

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- Lecture 30 - Advanced Characterization Techniques
- Lecture 31 - Advanced Characterization Techniques
- Lecture 32 - Advanced Characterization Techniques
- Lecture 33 - Advanced Characterization Techniques

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

NPTEL Video Course - Metallurgy and Material Science - Electroceramics

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1
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NPTEL Video Course - Metallurgy and Material Science - Fuels Refractory and Furnaces

Subject Co-ordinator - Prof. Satish Ch. Koria

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Energy Resources and Environment
- Lecture 2 - Characterization of Fuels
- Lecture 3 - Characterization of Fuels
- Lecture 4 - Production of Secondary Fuels
- Lecture 5 - Materials Balance in Coke-making
- Lecture 6 - Heat Balance and Clean Development Mechanism
- Lecture 7 - Production of Secondary Fuels
- Lecture 8 - Materials and Heat Balance in Gasification
- Lecture 9 - Principles of combustion
- Lecture 10 - Principles of combustion
- Lecture 11 - Materials balance in combustion
- Lecture 12 - Principles of Combustion
- Lecture 13 - Flame Temperature Calculations
- Lecture 14 - Refractory in Furnaces
- Lecture 15 - Refractory in Furnaces
- Lecture 16 - Furnace
- Lecture 17 - Heat Utilization in furnaces, energy flow diagrams
- Lecture 18 - Heat Utilization in furnaces, energy flow diagrams
- Lecture 19 - Heat Utilization in Furnaces
- Lecture 20 - Heat Utilization in Furnaces
- Lecture 21 - Transport Phenomena in Furnaces
- Lecture 22 - Macroscopic Energy Balance
- Lecture 23 - Macroscopic Energy Balance
- Lecture 24 - Macroscopic Energy Balance
- Lecture 25 - Macroscopic Energy Balance
- Lecture 26 - Macroscopic Energy Balance
- Lecture 27 - Principles of Burner Design
- Lecture 28 - Transport Phenomena in Furnaces
- Lecture 29 - Transport Phenomena in Furnaces

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- Lecture 30 - Transport Phenomena in Furnaces
- Lecture 31 - Transport Phenomena in Furnaces
- Lecture 32 - Steady Heat flows in Furnace and Heat Exchanger
- Lecture 33 - Exercises on Heat Flow in Furnaces and Heat Exchangers
- Lecture 34 - Exercises on Heat Flow in Furnaces and Heat Exchangers
- Lecture 35 - Miscellaneous Topics
- Lecture 36 - Miscellaneous Topics
- Lecture 37 - Miscellaneous Topics
- Lecture 38 - Miscellaneous topics
- Lecture 39 - Furnace efficiency, Fuel Saving, Carbon Offset
- Lecture 40 - Furnace efficiency, Fuel Saving, Carbon Offset

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

NPTEL Video Course - Metallurgy and Material Science - Introduction to Biomaterials

Subject Co-ordinator - Dr. Kantesh Balani, Dr. Birkamjit Basu

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to basic concepts of Biomaterials Science; Salient properties of important material
- Lecture 2 - Manufacturing and properties of metals, ceramics, polymers and composites
- Lecture 3 - Concept of biocompatibility, host response, structure-property of biological cell
- Lecture 4 - Structure and properties of cells, protein and cellular adaptation process
- Lecture 5 - Cell-I
- Lecture 6 - Cell-II
- Lecture 7 - Cell Migration and Cell Division and cell death
- Lecture 8 - Cell Differentiation and Cell Death
- Lecture 9 - Cell Apoptosis-I
- Lecture 10 - Cell Apoptosis-II
- Lecture 11 - Structure and properties of Protein; cell - material interaction
- Lecture 12 - Assessment of biocompatibility of biomaterials
- Lecture 13 - Biological testing (hemocompatibility, tribological testing)
- Lecture 14 - Structure and properties of bone as well as in vivo testing and histocompatibility assessment
- Lecture 15 - Important biometallic alloys
- Lecture 16 - Ti Alloy
- Lecture 17 - Co-Cr-Mo alloys
- Lecture 18 - Bioceramics
- Lecture 19 - Processing of Bioceramics
- Lecture 20 - Ceramics, Bioceramics and Glasses
- Lecture 21 - Sintering and mechanical properties of ceramics
- Lecture 22 - Fracture and toughening of ceramic composites
- Lecture 23 - Development of based bioceramic composites for hard tissue replacement
- Lecture 24 - Alternative phosphate materials, based composites with bactericidal property and glass ceramics
- Lecture 25 - Electrostatic Spraying of UHMWPE-HA-CNT composites
- Lecture 26 - Thin Films and Coatings
- Lecture 27 - Thermal Spray Coatings
- Lecture 28 - Biocompatibility of plasma sprayed CNT reinforced Hydroxyapatite biocomposite coatings
- Lecture 29 - Biocompatibility of Alumina and CNT reinforced Hydroxyapatite

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- Lecture 30 - Glass-ceramics for dental restoration applications
- Lecture 31 - Structure and properties of polymers
- Lecture 32 - Biodegradable polymers (Importance)
- Lecture 33 - Biodegradable polymers (Types)
- Lecture 34 - Mechanisms of Bioerosion
- Lecture 35 - External field and material interaction
- Lecture 36 - Tissue Engineering and wound healing
- Lecture 37 - Understanding Design Concepts of Bio-implants
- Lecture 38 - Understanding Design Concepts of Dental-implants
- Lecture 39 - Understanding Design Concepts of Orthopedic-implant

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

NPTEL Video Course - Metallurgy and Material Science - Materials and Energy balance in Metallurgical Processes

Subject Co-ordinator - Prof. Satish Ch. Koria

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Course
- Lecture 2 - Measurement of Quantities
- Lecture 3 - Exercises on Measurement of Quantities, Introduction to Stoichiometry
- Lecture 4 - Stoichiometry Concept and Exercise
- Lecture 5 - Exercise on Stoichiometry and Introduction to Thermochemistry
- Lecture 6 - Thermochemistry
- Lecture 7 - Exercise on Thermochemistry & Frequently Asked Questions
- Lecture 8 - Errors in Measurements
- Lecture 9 - Basics of Materials & Energy Balance
- Lecture 10 - Introduction to Mineral Beneficiation
- Lecture 11 - Materials Balance in Mineral Processing and Faq
- Lecture 12 - Exercises in Mineral Processing
- Lecture 13 - Calcination Concepts & Exercises
- Lecture 14 - Pyromet Extraction Unit Processes
- Lecture 15 - Predominance Area Diagram
- Lecture 16 - Material Balance in Roasting; illustration
- Lecture 17 - Heat Balance in Roasting illustration
- Lecture 18 - Exercises on Roasting
- Lecture 19 - Exercises on Roasting
- Lecture 20 - Smelting Matte Smelting
- Lecture 21 - Exercise-I Matte Smelting
- Lecture 22 - Exercise-II Matte Smelting
- Lecture 23 - Reduction Smelting
- Lecture 24 - Lead Smelting Material Balance
- Lecture 25 - Imperial Smelting Process
- Lecture 26 - Introduction to Ironmaking
- Lecture 27 - Coke Making
- Lecture 28 - Ironmaking Fundamentals
- Lecture 29 - Material & Heat Balance in Ironmaking - I

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

- Lecture 30 - Material & Heat Balance in Ironmaking - II
- Lecture 31 - RIST Diagram - I
- Lecture 32 - RIST Diagram - II
- Lecture 33 - Concepts in Converting
- Lecture 34 - Exercise in Converting
- Lecture 35 - Additional Topics - I Melting in Cupola
- Lecture 36 - Additional Topics - II Gasification
- Lecture 37 - Additional Topics - III Material Balance in Gasification
- Lecture 38 - Additional Topics - IV Industrial Furnaces
- Lecture 39 - Energy Balance in Industrial Furnaces
- Lecture 40 - Thoughts on Application of Energy Balance

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

NPTEL Video Course - Metallurgy and Material Science - Optoelectronic Materials and Devices

Subject Co-ordinator - Prof. Deepak Gupta, Prof. Monica Katiyar

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Conductivity of materials, Drude's theory and its failures
- Lecture 2 - Free electron theory
- Lecture 3 - Free electron theory
- Lecture 4 - Crystal structure, Reciprocal lattice I
- Lecture 5 - Reciprocal lattice II, Brillouin zone and Bragg's diffraction condition
- Lecture 6 - Electrons in a crystal, Bloch's electron
- Lecture 7 - Free electron band diagrams in an empty lattice
- Lecture 8 - Effect of periodic potential, Origin of band-gap through Kronig-Penny model
- Lecture 9 - Electron dynamics
- Lecture 10 - Conduction in relation to band diagrams
- Lecture 11 - Semiconductor E-k diagrams and their material properties
- Lecture 12 - Equilibrium carrier statistics in semiconductors
- Lecture 13 - Equilibrium carrier statistics in semiconductors
- Lecture 14 - Equilibrium carrier statistics in semiconductors
- Lecture 15 - Doping in semiconductors
- Lecture 16 - Equilibrium carrier statistics in semiconductors
- Lecture 17 - Equilibrium carrier statistics in semiconductors
- Lecture 18 - Semiconductor junctions in band-diagrams
- Lecture 19 - Linear dielectric behavior
- Lecture 20 - Non-linear dielectric behavior
- Lecture 21 - Carrier recombination-generation - I
- Lecture 22 - Carrier recombination-generation - II
- Lecture 23 - R-G statistics via R-G centers
- Lecture 24 - Optoelectronic materials and bandgap engineering
- Lecture 25 - Optical properties of materials
- Lecture 26 - Optical properties of single interfaces
- Lecture 27 - Optical Properties of two interfaces
- Lecture 28 - Drift
- Lecture 29 - Diffusion

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

- Lecture 30 - Continuity Equation
- Lecture 31 - Resistor and diode (p-n junction)
- Lecture 32 - Fundamentals of p-n junction
- Lecture 33 - Fundamentals of p-n junction (Continued...)
- Lecture 34 - Solar cells
- Lecture 35 - Microelectronics processing
- Lecture 36 - MOS capacitor
- Lecture 37 - Transistor
- Lecture 38 - Organic Electronics
- Lecture 39 - Organic Light Emitting Diodes
- Lecture 40 - Organic Solar Cells and Organics Thin Film Transistors

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

NPTEL Video Course - Metallurgy and Material Science - Steel Making

Subject Co-ordinator - Prof. Satish Ch. Koria, Prof. Dipak Mazumdar

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
Lecture 34
Lecture 35
Lecture 36
Lecture 37
Lecture 38
Lecture 39
Lecture 40
Lecture 41
Lecture 42

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

NPTEL Video Course - Metallurgy and Material Science - Structure of Materials

Subject Co-ordinator - Dr. Anandh Subramaniam

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Overview
- Lecture 2 - Geometry of Crystals
- Lecture 3 - Geometry of Crystals
- Lecture 4 - Geometry of Crystals
- Lecture 5 - Geometry of Crystals
- Lecture 6 - Geometry of Crystals
- Lecture 7 - Geometry of Crystals
- Lecture 8 - Geometry of Crystals
- Lecture 9 - Geometry of Crystals
- Lecture 10 - Geometry of Crystals
- Lecture 11 - Geometry of Crystals
- Lecture 12 - Geometry of Crystals
- Lecture 13 - Miller Indices
- Lecture 14 - Miller Indices (Continued...) and Crystal Structures
- Lecture 15 - Crystal Structures
- Lecture 16 - Crystal Structures
- Lecture 17 - Crystal Structures
- Lecture 18 - Crystal Structures
- Lecture 19 - Crystal Structures
- Lecture 20 - Crystal Structures
- Lecture 21 - Crystal Structures (Continued...) and Defects in Crystals
- Lecture 22 - Defects in Crystals
- Lecture 23 - Defects in Crystals
- Lecture 24 - Defects in Crystals
- Lecture 25 - Defects in Crystals
- Lecture 26 - Defects in Crystals
- Lecture 27 - Defects in Crystals
- Lecture 28 - Defects in Crystals
- Lecture 29 - Defects in Crystals

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

- Lecture 30 - Diffusion in Solids
- Lecture 31 - Diffusion in Solids
- Lecture 32 - Phase Diagrams
- Lecture 33 - Phase Diagrams
- Lecture 34 - Phase Diagrams
- Lecture 35 - Phase Diagrams
- Lecture 36 - Phase Diagrams
- Lecture 37 - Phase Transformations
- Lecture 38 - Phase Transformations
- Lecture 39 - Phase Transformations
- Lecture 40 - Phase Transformations
- Lecture 41 - Phase Transformations
- Lecture 42 - Phase Transformations
- Lecture 43 - Phase Transformations
- Lecture 44 - Phase Transformations
- Lecture 45 - Phase Transformations

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

NPTEL Video Course - Metallurgy and Material Science - Environmental Degradation of Materials

Subject Co-ordinator - Dr. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction, Basic definition of corrosion

Lecture 2 - Forms of Degradation, Thermodynamics of corrosion

Lecture 3 - Thermodynamics of corrosion

Lecture 4 - Thermodynamics of corrosion

Lecture 5 - Thermodynamics of corrosion, Electrochemical series, Concentration cell

Lecture 6 - Reduction Potential series, Pourbaix diagram

Lecture 7 - Pourbaix diagram

Lecture 8 - Pourbaix diagram

Lecture 9 - Pourbaix diagram, Kinetics of corrosion

Lecture 10 - Kinetics of corrosion, Rate expression, Solved problems

Lecture 11 - Solved problems on the corrosion rate, Exchange current density

Lecture 12 - Exchange current density, Polarization, Activation Polarization, Tafel Equation

Lecture 13 - Activation Polarization, Concentration Polarization

Lecture 14 - Concentration Polarization, Mixed Potential Theory

Lecture 15 - Mixed Potential Theory, Explanation of corrosion events on the basis of Mixed potential theory,

Lecture 16 - Explanation of corrosion events on the basis of Mixed potential theory, Effect of impurity, Effect

Lecture 17 - Explanation of corrosion events on the basis of Mixed potential theory, Effect of area factor, C

Lecture 18 - Passivation and Mixed potential theory

Lecture 19 - Passivation and Mixed potential theory

Lecture 20 - Different corrosion protection mechanisms, electrochemical ways of protection, cathodic protection

Lecture 21 - Cathodic and anodic protection

Lecture 22 - Anodic protection, Forms of corrosion, Factors of corrosion

Lecture 23 - Forms of corrosion, Uniform Corrosion, Galvanic corrosion

Lecture 24 - Galvanic corrosion

Lecture 25 - Crevice corrosion

Lecture 26 - Crevice corrosion, Pitting corrosion

Lecture 27 - Pitting corrosion, Intergranular corrosion

Lecture 28 - Intergranular corrosion, Dealloying

Lecture 29 - Dealloying, Erosion corrosion

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- Lecture 30 - Erosion corrosion, Cavitation
- Lecture 31 - Cavitation, Fretting corrosion, corrosion cracking
- Lecture 32 - Stress corrosion cracking
- Lecture 33 - Stress corrosion cracking
- Lecture 34 - Biologically influenced corrosion, liquid metal attack
- Lecture 35 - Corrosion protection, change of materials, effect of design of component
- Lecture 36 - Corrosion protection, change of environment, Inhibitors, coatings
- Lecture 37 - Oxidation and hot corrosion, pitting Bedworth ratio, thermodynamics of oxidation
- Lecture 38 - Thermodynamics of oxidation, Ellingham diagram, oxidation kinetics and laws
- Lecture 39 - Oxide structure and Oxidation
- Lecture 40 - Hot corrosion, corrosion testing and failure analysis, linear polarization
- Lecture 41 - Degradation of composites, polymers and ceramics, corrosion and society

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Phase Diagrams in Materials Science and Engineering

Subject Co-ordinator - Dr. Krishanu Biswas

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to the course
- Lecture 2 - Heterogeneous equilibrium and Free energy Formalism
- Lecture 3 - Concept of Chemical Potential
- Lecture 4 - Phase Rule-I
- Lecture 5 - Phase Rule-II and Single Component Equilibria
- Lecture 6 - Single Component Phase Diagram
- Lecture 7 - Binary Phase Diagram - Isomorphous Diagram
- Lecture 8 - Binary Isomorphous System
- Lecture 9 - Solidification of Isomorphous Alloys
- Lecture 10 - Free Energy of Binary Isomorphous Phase Diagram
- Lecture 11 - Phase Diagram of Binary Eutectic Systems Edit Lesson
- Lecture 12 - Solidification of eutectic, hypo-eutectic and hyper-eutectic alloys & their morphologies - I
- Lecture 13 - Solidification of eutectic, hypo-eutectic and hyper-eutectic alloys & their morphologies - II
- Lecture 14 - Phase diagrams of binary eutectic two terminal solid solution
- Lecture 15 - Phase diagrams of binary peritectic System - I
- Lecture 16 - Phase diagrams of binary peritectic System - II
- Lecture 17 - Phase diagrams of binary peritectic System with intermediate phases
- Lecture 18 - Intermediate Phases
- Lecture 19 - Introduction to Monotectic Phase Diagram
- Lecture 20 - Microstructural Evolution of Monotectic Phase Diagram
- Lecture 21 - Free Energy Composition diagrams for Monotectic systems and Syntactic phase diagram
- Lecture 22 - Quasichemical theory - I
- Lecture 23 - Quasichemical theory - II
- Lecture 24 - Quasichemical theory Free energy formalism
- Lecture 25 - Solid state reaction
- Lecture 26 - Introduction to Iron-Carbon phase diagram
- Lecture 27 - Eutectoid transformation in Iron-Carbon phase diagram
- Lecture 28 - Austenite to pearlite transformation in Iron-Carbon phase diagram
- Lecture 29 - Hypo-eutectoid steels

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- Lecture 30 - Pearlite Transformation
- Lecture 31 - Martensite Transformation - I
- Lecture 32 - Martensite Transformation - II
- Lecture 33 - Tempering of Martensite
- Lecture 34 - Bainite Transformation
- Lecture 35 - TTT curves for Steel
- Lecture 36 - Cast Iron - I
- Lecture 37 - Cast Iron - II
- Lecture 38 - Ductile Iron and Nodular Iron
- Lecture 39 - Malleable Iron
- Lecture 40 - Alloyed Cast Iron
- Lecture 41 - Phase Diagram for different Solid State Reaction
- Lecture 42 - Phase Diagram of Ceramic
- Lecture 43 - Ternary Phase Diagram - I
- Lecture 44 - Ternary Phase Diagram - II
- Lecture 45 - Ternary Phase Diagram and Tie Line Construction - I
- Lecture 46 - Ternary Phase Diagram and Tie Line Construction - II
- Lecture 47 - Ternary Phase Diagram and Tie Line Construction - III
- Lecture 48 - Ternary Isomorphous Phase Diagram
- Lecture 49 - Ternary Three Phase Equilibria
- Lecture 50 - Three Phase Equilibria in Ternary Systems - I
- Lecture 51 - Three Phase Equilibria in Ternary Systems - II
- Lecture 52 - Solidification Behaviour of Ternary Alloy
- Lecture 53 - Three Phase Equilibria
- Lecture 54 - Ternary Four Phase Equilibria - I
- Lecture 55 - Ternary Four Phase Equilibria - II
- Lecture 56 - Solidification Behaviour of Ternary Eutectic Alloys
- Lecture 57 - Phase Diagram of Ternary Eutectic with Terminal Solid Solution
- Lecture 58 - Ternary Peritectic Reaction
- Lecture 59 - Quasi-peritectic Reaction
- Lecture 60 - Case Studies on Ternary Phase Diagrams - I
- Lecture 61 - Case Studies on Ternary Phase Diagrams - II

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Fundamentals of Material Processing - I

Subject Co-ordinator - Prof. Shashank Shekhar

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction
- Lecture 2 - Solidification (Casting)
- Lecture 3 - Solidification (Welding)
- Lecture 4 - Thermodynamics of Solidification
- Lecture 5 - Kinetics of Solidification (Homogeneous)
- Lecture 6 - Kinetics of Solidification (Heterogeneous)
- Lecture 7 - Heat Flow
- Lecture 8 - Heat Flow (Continued...)
- Lecture 9 - Heat Flow (Insulating Mold Condition)
- Lecture 10 - Heat Flow (Insulating Mold Condition) (Continued...)
- Lecture 11 - Heat Flow (Interface Resistance Controlled Solidification)
- Lecture 12 - Heat Flow (Effect of Superheat)
- Lecture 13 - Heat Flow (Solidification of Alloys)
- Lecture 14 - Composition Variation
- Lecture 15 - Composition Variation (Continued...)
- Lecture 16 - Complete and Limited Liquid Diffusion
- Lecture 17 - Mixed Mode Solidification
- Lecture 18 - Mixed Mode Solidification and Zone Refining
- Lecture 19 - Zone Refining (Continued...)
- Lecture 20 - Cellular Solidification of Single Phase Alloy
- Lecture 21 - Cellular Solidification of Single Phase Alloy (Continued...)
- Lecture 22 - Cellular Solidification of Single Phase Alloy (Continued...)
- Lecture 23 - Plane Front Solidification of Multiphase Alloy
- Lecture 24 - Plane Front Solidification of Multiphase Alloy (Continued...)
- Lecture 25 - Fluid Flow Considerations
- Lecture 26 - Introduction to Powder Processing
- Lecture 27 - Introduction to Powder Processing (Continued...)
- Lecture 28 - Powder characterization
- Lecture 29 - Powder Characterization Techniques

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- Lecture 30 - Powder Characterization using Surface Area
- Lecture 31 - Powder Characterization using Gas Permeability Method
- Lecture 32 - Powder Manufacturing
- Lecture 33 - Powder Manufacturing (Continued...)
- Lecture 34 - Powder Manufacturing (Continued...)
- Lecture 35 - Powder Consolidation
- Lecture 36 - Powder Consolidation (Continued...)
- Lecture 37 - Particle Packing
- Lecture 38 - Powder Compaction
- Lecture 39 - Powder Compaction (Continued...)
- Lecture 40 - Sintering Theory

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Heat Treatment and Surface Hardening - I

Subject Co-ordinator - Dr. Kallol Mondal, Prof. Sandeep Sangal

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Heat Treatment and Importance of Material Tetrahedron
- Lecture 2 - Case studies in reference to Material tetrahedron T/t information and processing
- Lecture 3 - Few more case studies in reference to processing with T/t modification
- Lecture 4 - Critical Definition and Phase Transformation Thermodynamics and Driving Force
- Lecture 5 - Thermodynamics of Phase Transformation Driving force of Phase Transformation
- Lecture 6 - Thermodynamics of Phase Transformation and Driving Force for Phase Transformation
- Lecture 7 - Finding Value of Driving Force (ΔG) and Single Component (liquid-solid)
- Lecture 8 - Finding Value of Driving Force (ΔG) and Nucleation Single Component (liquid-solid)
- Lecture 9 - Nucleation Treatment Single Component (Solid-Liquid) - I
- Lecture 10 - Nucleation Treatment Single Component (Solid-Liquid) - II
- Lecture 11 - Solved Problem on Nucleation rate and How to determine the value of $\Delta \sigma_{sl}$ Physical Concept & Inter
- Lecture 12 - How to determine the value of $\Delta \sigma_{sl}$ (Physical Concept and Interfacial Energy)
- Lecture 13 - Interfacial Energy - I
- Lecture 14 - Interfacial Energy - II
- Lecture 15 - Heterogeneous Nucleation - I
- Lecture 16 - Heterogeneous Nucleation - II
- Lecture 17 - Solid - Solid Transformation and Nucleation rate - I
- Lecture 18 - Solid - Solid Transformation and Nucleation rate - II
- Lecture 19 - Phase Diagram and G vs X plot - I
- Lecture 20 - Phase Diagram and G vs X plot - II
- Lecture 21 - Phase Diagram and G vs X plot - III
- Lecture 22 - Introduction to Kinetics of Phase Transformation
- Lecture 23 - Variation of ΔG^* and r^* with Undercooling
- Lecture 24 - Nucleation rate - I
- Lecture 25 - Nucleation Rate - II
- Lecture 26 - Critical Undercooling
- Lecture 27 - Maximum nucleation rate for homogeneous nucleation
- Lecture 28 - Maximum nucleation rate for heterogeneous nucleation
- Lecture 29 - Nucleation kinetics in solid state

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

- Lecture 30 - Interface controlled growth
- Lecture 31 - Diffusion controlled growth
- Lecture 32 - Avrami Kinetics - I
- Lecture 33 - Avrami Kinetics - II
- Lecture 34 - Avrami Kinetics - III
- Lecture 35 - Time-Temperature-Transformation (TTT) diagram
- Lecture 36 - Diffusion in Solids - I
- Lecture 37 - Diffusion in Solids - II
- Lecture 38 - Diffusion in Solids - III
- Lecture 39 - Diffusion in Solids - IV
- Lecture 40 - Applications of heat treatment

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Fundamentals of Material Processing - Part 2

Subject Co-ordinator - Prof. Shashank Shekhar, Prof. Jitesh J Thakkar

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Metal Working
- Lecture 2 - Continuum Mechanics
- Lecture 3 - Stress Invariants
- Lecture 4 - Strain Tensors and Mohr circle for strains
- Lecture 5 - Yield Stress Criterion
- Lecture 6 - Effective Stress and Strain
- Lecture 7 - Work Hardening and Flow Behaviour
- Lecture 8 - Effect of Strain Rate
- Lecture 9 - Combined Effect of Strain, Strain Rate and Temperature
- Lecture 10 - Effect of Temperature
- Lecture 11 - Cold, Warm and Hot Working
- Lecture 12 - Mechanics of Metal Working
- Lecture 13 - Wire Drawing
- Lecture 14 - Wire Drawing (Continued...)
- Lecture 15 - Hodographs
- Lecture 16 - Upper-Bound Analysis
- Lecture 17 - Plane Strain Indentation
- Lecture 18 - Strain Calculation Models and Friction
- Lecture 19 - Types of Friction
- Lecture 20 - Effect of Friction in Rolling
- Lecture 21 - Vacuum Technology
- Lecture 22 - Vacuum Technology (Continued...)
- Lecture 23 - Thermal Evaporation
- Lecture 24 - Thermal Evaporation (Continued...)
- Lecture 25 - Thermal Evaporation (Continued...)
- Lecture 26 - Plasma Physics
- Lecture 27 - Plasma Physics (Continued...)
- Lecture 28 - Sputtering
- Lecture 29 - Sputtering (Continued...)

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- Lecture 30 - Sputtering (Continued...)
- Lecture 31 - Chemical Vapor Deposition
- Lecture 32 - Chemical Vapor Deposition (Continued...)
- Lecture 33 - Chemical Vapor Deposition (Continued...)
- Lecture 34 - Chemical Vapor Deposition (Continued...)
- Lecture 35 - Epitaxy, Molecular Beam Epitaxy and Atomic Layer Deposition
- Lecture 36 - Adsorption and Nucleation
- Lecture 37 - Thin Film Growth
- Lecture 38 - Kinetics of Thin Film Growth
- Lecture 39 - Thin Film Morphology- Zone Structure Model
- Lecture 40 - Thin Film Characterization
- Lecture 41 - Thin Film Characterization

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Nature and Properties of Materials - An Introduction

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Material Evolution
- Lecture 2 - Bonding in Materials
- Lecture 3 - Correlation between bond and physical properties
- Lecture 4 - Crystal Structure
- Lecture 5 - Unit Cell (Primitive and Non-primitive)
- Lecture 6 - Crystal Systems and Bravais Lattices
- Lecture 7 - Bravais Lattice and Symmetry in Crystals
- Lecture 8 - Symmetry in Crystals
- Lecture 9 - Symmetry and Correlation with the Bravais Lattice
- Lecture 10 - Miller Indices (Planes and Directions)
- Lecture 11 - Miller Indices - Part 2
- Lecture 12 - Miller Indices - Part 3
- Lecture 13 - Miller Indices and Weiss Zone Law
- Lecture 14 - Structure of Metals and Alloys
- Lecture 15 - Structure of Metals, Packing, Co-ordination and Interstices
- Lecture 16 - Interstices, Solid Solutions and Alloys
- Lecture 17 - Solid Solutions
- Lecture 18 - Solid Solutions
- Lecture 19 - Covalent Solids
- Lecture 20 - Covalent Solids (Continued...) and Ionic Solids
- Lecture 21 - Ionic Solids
- Lecture 22 - Ionic solids (Continued...)
- Lecture 23 - ionic Solids (Continued...)
- Lecture 24 - Ionic Solids (Continued...)
- Lecture 25 - Ionic Solids (Ceramics)
- Lecture 26 - HCP based Structure
- Lecture 27 - Structure of Non-crystalline Solids (glasses)
- Lecture 28 - Structure of Non-Crystalline Solids
- Lecture 29 - Structure of Non-Crystalline Solids (Polymers)

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

- Lecture 30 - Structure of Polymers
- Lecture 31 - Structure of Polymers (Continued...)
- Lecture 32 - Structure Determination (X-ray Diffraction)
- Lecture 33 - X-ray Diffraction
- Lecture 34 - X-ray Diffraction (Continued...)
- Lecture 35 - X-ray Diffraction (Continued...)
- Lecture 36 - X-ray Diffraction (Continued...)
- Lecture 37 - X-ray Diffraction (Continued...)
- Lecture 38 - Defects in Solids (Point Defects)
- Lecture 39 - Point Defect Concentration
- Lecture 40 - 2-D Defects

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Defects in Crystalline Solids - Part I

Subject Co-ordinator - Prof. Shashank Shekhar

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Defects
- Lecture 2 - Equilibrium Points Defects
- Lecture 3 - Energy of Vacancy Formation
- Lecture 4 - Vacancy Concentration Measurement Techniques
- Lecture 5 - Self-interstitial Defects+Frenkel Defects
- Lecture 6 - Schottky Defects+Extrinsic Defects
- Lecture 7 - Interstitials in Iron
- Lecture 8 - Defects Reaction+Kroger-Vink Notation
- Lecture 9 - Defects Reaction and its Thermodynamics
- Lecture 10 - Equilibrium Concentration using Defects Reaction
- Lecture 11 - Examples on defect reaction
- Lecture 12 - Diffusion (Interstitial Diffusion)
- Lecture 13 - Non-steady state diffusion
- Lecture 14 - Self-diffusion + Examples
- Lecture 15 - Diffusion in substitutional alloys+Diffusion along defects
- Lecture 16 - History of Dislocations
- Lecture 17 - Volterra Model + Structure of Dislocations + Burger vectors
- Lecture 18 - Characteristics of Dislocations
- Lecture 19 - Mixed Dislocations + Dislocation Loops
- Lecture 20 - Elastic Continuum Model + Strain field for screw dislocations
- Lecture 21 - Stress and Strain Fields
- Lecture 22 - Stress State around Edge Dislocations+Elastic Energy of Dislocations
- Lecture 23 - Glide Forces on Dislocations+Line Tension on Dislocations
- Lecture 24 - Climb Forces on Dislocations+Interaction Between Dislocations
- Lecture 25 - Image Forces on Dislocations
- Lecture 26 - Resistance to Dislocation Motion+Peierl Nebarro Valley
- Lecture 27 - Slip System+Examples
- Lecture 28 - Dislocations and Slips+Examples
- Lecture 29 - Critical resolved Shear Stress+Examples (Continued...)

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- Lecture 30 - Glide+Kinks
- Lecture 31 - Cross-slip+Climb
- Lecture 32 - Climb+Jogs
- Lecture 33 - Examples on Jogs+Dislocation Intersection
- Lecture 34 - Dislocation Intersection and step characteristics+Superjogs
- Lecture 35 - Strain and strain-rate due to dislocation motion+Velocity of dislocations+Observation of dislocation
- Lecture 36 - Observation of dislocation (Continued...) + Dislocation Dynamics
- Lecture 37 - Dislocations in FCC+Partial dislocations
- Lecture 38 - Partial dislocations (Continued...) +Stacking Fault
- Lecture 39 - Thompson's Tetrahedron+Examples
- Lecture 40 - Dislocations in BCC+Asymmetry of Slip

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Corrosion - Part I

Subject Co-ordinator - Dr. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to corrosion - I
- Lecture 2 - Introduction to corrosion - II
- Lecture 3 - Types and forms of corrosion
- Lecture 4 - Uniform and Galvanic corrosion
- Lecture 5 - Crevice and Pitting corrosion
- Lecture 6 - Forms of corrosion
- Lecture 7 - Electrochemical Nature of Corrosion and its Thermodynamics
- Lecture 8 - Thermodynamics aspects of corrosion - I
- Lecture 9 - Thermodynamics aspects of corrosion - II
- Lecture 10 - Thermodynamics aspects of corrosion - III
- Lecture 11 - Relation Between Free Energy and Equilibrium Constant
- Lecture 12 - Derivation of Nernst Equation
- Lecture 13 - Standard Reduction Potential Series for Pure Metals
- Lecture 14 - Reduction Potentials in Acidic and Neutral Solutions
- Lecture 15 - Nernst equation in terms of pH
- Lecture 16 - Limitations of Standard Reduction Potential Series of Pure Metals
- Lecture 17 - Concentration Cell Formation and Galvanic Series
- Lecture 18 - Examples of Concentration cell and Spontaneity of Corrosion Process
- Lecture 19 - Spontaneity of Corrosion Process and Introduction to Pourbaix Diagram
- Lecture 20 - Construction of Pourbaix Diagram
- Lecture 21 - Construction of Pourbaix diagram for Ni-H₂O system - I
- Lecture 22 - Construction of Pourbaix diagram for Ni-H₂O system - II
- Lecture 23 - Construction of Pourbaix diagram for Ni-H₂O system - III
- Lecture 24 - Pourbaix diagram of Ni-H₂O and Al-H₂O
- Lecture 25 - Inferences from Pourbaix diagram of Fe-H₂O and Al-H₂O
- Lecture 26 - Estimation of Corrosion Rate - I
- Lecture 27 - Estimation of Corrosion Rate - II
- Lecture 28 - Estimation of Corrosion Rate - III
- Lecture 29 - Exchange Current Density

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

- Lecture 30 - Exchange Current Density and Standard Hydrogen Electrode
- Lecture 31 - Electrical Double Layer and Polarization
- Lecture 32 - Correlation between Current Density and Overvoltage
- Lecture 33 - Introduction to Butler-Volmer Equation
- Lecture 34 - Derivation of Tafel Equation
- Lecture 35 - Tafel Plot and Activation Polarization
- Lecture 36 - Activation polarization, concentration polarization and total polarization
- Lecture 37 - Summary of concentration polarization (CP) and introduction to mixed potential theory - I
- Lecture 38 - Mixed potential theory - II
- Lecture 39 - Understanding of mixed potential theory through the case studies and events of corrosion - I
- Lecture 40 - Understanding of mixed potential theory through the case studies and events of corrosion - II
- Lecture 41 - Understanding of mixed potential theory through the case studies and events of corrosion - III

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Solar Photovoltaics: Principles, Technologies and

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Solar Energy
- Lecture 2 - Solar Radiation
- Lecture 3 - Atmospheric Effects on Solar Radiation
- Lecture 4 - Effect of Location on Time
- Lecture 5 - Sun-Earth Angular Relations
- Lecture 6 - Solar Radiation Measurements
- Lecture 7 - Introduction to Band Theory
- Lecture 8 - Semiconductor Basics - I
- Lecture 9 - Semiconductor Basics - II
- Lecture 10 - Electrical Properties of Semiconductors
- Lecture 11 - Carrier Transport
- Lecture 12 - Carrier Transport, Generation and Recombination
- Lecture 13 - Recombination-Generation statistics
- Lecture 14 - Recombination-Generation statistics (Continued...)
- Lecture 15 - Recombination-Generation statistics (Continued...)
- Lecture 16 - P-N Junction basics
- Lecture 17 - P-N Junction Characteristics
- Lecture 18 - P-N Junction
- Lecture 19 - P-N Junction Analysis (Dark)
- Lecture 20 - P-N Junction Analysis (Dark)
- Lecture 21 - P-N Junction Analysis (Light)
- Lecture 22 - P-N Junction Analysis (Light)
- Lecture 23 - P-N Junction Analysis (Light)
- Lecture 24 - P-N Junction Analysis (Light)
- Lecture 25 - Solar Cell Device Parameters
- Lecture 26 - Solar Cell Device Parameters
- Lecture 27 - Solar PV Technologies
- Lecture 28 - Generation-I Technologies (Mono Silicon Solar Cells)
- Lecture 29 - Generation-I Technologies (Mono Silicon Solar Cells)

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

- Lecture 30 - Generation-I Technologies (Poly Silicon Solar Cells)
- Lecture 31 - Manufacturing of Si
- Lecture 32 - Generation I Technologies
- Lecture 33 - Generation II Technologies
- Lecture 34 - Generation II Technologies
- Lecture 35 - Generation II Technologies
- Lecture 36 - Generation II Technologies
- Lecture 37 - Generation II Technologies
- Lecture 38 - Generation III Technologies
- Lecture 39 - Generation III Technologies
- Lecture 40 - Generation III Technologies
- Lecture 41 - Generation III Technologies

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Defects in Crystalline Solids - Part II

Subject Co-ordinator - Prof. Shashank Shekhar

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Dislocation structure in FCC

Lecture 2 - Partial dislocations in FCC

Lecture 3 - Thompsons Tetrahedron

Lecture 4 - Dislocation lock in FCC

Lecture 5 - Other defects in FCC (Twins and Frank Partial)

Lecture 6 - Dislocation structure in BCC

Lecture 7 - Soft core and Hard core for Screw dislocation in BCC

Lecture 8 - Dislocation structure in HCP

Lecture 9 - Burger vector and partial dislocation in HCP

Lecture 10 - Dislocation structure in ionic crystal

Lecture 11 - Dislocation structure in superlattices

Lecture 12 - Stacking fault and Kear-Wilksdorf lock in superlattices

Lecture 13 - Dislocation interaction & Strain hardening

Lecture 14 - Origin and Nucleation of dislocations

Lecture 15 - Multiplication of dislocations

Lecture 16 - Interaction of point defects and dislocation - Solid Solution Strengthening

Lecture 17 - Cottrell atmosphere and Yield-point phenomenon

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Corrosion - Part II

Subject Co-ordinator - Dr. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Recap of Electrochemical Polarization
- Lecture 2 - Recap of Electrochemical Polarization - Activation and Concentration Polarization
- Lecture 3 - Electrochemical Polarization
- Lecture 4 - Activation and Concentration Polarization
- Lecture 5 - Concentration Polarization and Mixed Potential Theory
- Lecture 6 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Introduction
- Lecture 7 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 1
- Lecture 8 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 2
- Lecture 9 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 2 (Continued...)
- Lecture 10 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 3
- Lecture 11 - Effect of Exchange Current Density on Corrosion Rate of an Active Metal
- Lecture 12 - Area Effect of the Cathodic and Anodic Component - I
- Lecture 13 - Area Effect of the Cathodic and Anodic Component - II
- Lecture 14 - Explanation of Corrosion Processes on the Basis of Mixed Potential Theory
- Lecture 15 - Galvanic Coupling between Two Active Metals
- Lecture 16 - Theory of Sacrificial Anode for the Protection of Steel Objects
- Lecture 17 - Effect of two Active Metals on Fe-corrosion when they are Galvanically Coupled
- Lecture 18 - Corrosion of Metals when Cathodic Protection is Concentration Controlled
- Lecture 19 - Effect of Velocity on the Corrosion Rate of an Active Metal
- Lecture 20 - Concentration Polarization and Activation Polarization
- Lecture 21 - Numerical Problems and Passivation
- Lecture 22 - Theory of Passivation - I
- Lecture 23 - Theory of Passivation - II
- Lecture 24 - Interaction between Passivation and Pourbaix Diagram - I
- Lecture 25 - Interaction between Passivation and Pourbaix Diagram - II
- Lecture 26 - Passivity
- Lecture 27 - Interaction of Cathodic Polarization with an Active-Passive Metal
- Lecture 28 - Interaction of Anodic Polarization with an Active-Passive Metal
- Lecture 29 - Passivation and Mixed Potential Theory

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

- Lecture 30 - Passivation and Mixed Potential Theory
- Lecture 31 - Effect of Galvanic Coupling between an Active-Passive Metal and a Noble Metal
- Lecture 32 - Anodic Protection of an Active-Passive Metal and an Introduction of Linear Polarization
- Lecture 33 - Linear Polarization and Understanding Relative Corrosion Resistance of a Metal
- Lecture 34 - Oxidation of Metals and Alloys
- Lecture 35 - Different Stages of Oxidation and Pilling Bedworth Ratio
- Lecture 36 - Pilling Bedworth Ratio of Different Metal Oxides
- Lecture 37 - Thermodynamics of Oxidation
- Lecture 38 - Construction of Ellingham Diagram - I
- Lecture 39 - Construction of Ellingham Diagram - II
- Lecture 40 - Kinetics of Oxidation
- Lecture 41 - Oxide Structure and Oxidation Mechanism

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Fundamentals and Applications of Dielectric Ceramics

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Outline of the Course
- Lecture 2 - Basics of Crystal Structure
- Lecture 3 - Basics of Crystallography and Bonding
- Lecture 4 - Arrangement of Atoms in Crystal Lattice
- Lecture 5 - Structure Formation
- Lecture 6 - Pauling's Rule and Crystal Structure of Ceramics
- Lecture 7 - Ceramic Materials
- Lecture 8 - Defect Chemistry
- Lecture 9 - Defect Chemistry
- Lecture 10 - Concentration and Effect of Intrinsic Impurities
- Lecture 11 - Intrinsic and Extrinsic Defects
- Lecture 12 - Defect Concentration
- Lecture 13 - Intrinsic Ionization in Metal Oxides
- Lecture 14 - Brouwer's Diagram
- Lecture 15 - Introduction to Dielectrics
- Lecture 16 - Dielectric Displacement and Polarization Mechanism
- Lecture 17 - Polarization Mechanisms
- Lecture 18 - Dielectric Polarizability - 1
- Lecture 19 - Dielectric Polarizability - 2
- Lecture 20 - Frequency Dependence of Dielectrics
- Lecture 21 - Losses in Dielectric Materials
- Lecture 22 - Frequency Dependence of Dielectric Constant
- Lecture 23 - Dipolar Relaxation
- Lecture 24 - Debye Equations for Dipolar Relaxation
- Lecture 25 - Impedance Spectroscopy
- Lecture 26 - Impedance Spectroscopy and Dielectric Breakdown
- Lecture 27 - Basics of Non-linear Dielectrics
- Lecture 28 - Piezoelectric Effect
- Lecture 29 - Pyroelectric Effect and Electrostriction

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

- Lecture 30 - Thermodynamics of Piezoelectric and Pyroelectric Materials
- Lecture 31 - Basics of Ferroelectric Materials
- Lecture 32 - Ferroelectric Phase Transitions
- Lecture 33 - Thermodynamics of Phase Transition in Ferroelectrics
- Lecture 34 - Second Order Phase Transition in Ferroelectric Materials
- Lecture 35 - First Order Phase Transition in Ferroelectric Materials
- Lecture 36 - Domain Walls in Ferroelectric Materials
- Lecture 37 - Domain Structure and Properties of Ferroelectric Materials
- Lecture 38 - Phase Diagram and Measurements of Ferroelectric Materials
- Lecture 39 - Principal of Measurements and Applications of Piezoelectric and Pyroelectric Materials
- Lecture 40 - Applications of Piezoelectric and Pyroelectric Materials

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Properties of Materials (Nature and Properties of

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to the Course
- Lecture 2 - Basic Material Properties - Stress and Strain Tensor
- Lecture 3 - Normal and Shear Stress and Transformation of Axes
- Lecture 4 - Transformation of Axes and Principle Stresses
- Lecture 5 - True and Engineering Stress and Strain
- Lecture 6 - Illustration to True and Engineering Stress and Strain
- Lecture 7 - Tensor Notation of Strain
- Lecture 8 - Introduction to Elasticity and Elastic Properties
- Lecture 9 - Theory of Elasticity
- Lecture 10 - Atomic Basis of Elasticity
- Lecture 11 - Elasticity of Different Materials, Design of Composites
- Lecture 12 - Composites, Anelastic Behaviour
- Lecture 13 - Stress-Strain Curve and Anelasticity
- Lecture 14 - Mechanism of Anelasticity
- Lecture 15 - Relaxation Time and Damping Capacity
- Lecture 16 - Plastic Deformation of Materials
- Lecture 17 - True and Engineering Stress-Strain Curves
- Lecture 18 - Necking Phenomenon During Tension Test
- Lecture 19 - Microscopic Mechanism of Plastic Deformation
- Lecture 20 - Introduction to Slip
- Lecture 21 - Slip Systems
- Lecture 22 - Resolved Shear Stress
- Lecture 23 - Critical Resolved Shear Stress
- Lecture 24 - Theoretical Strength and Role of Dislocations
- Lecture 25 - Dislocations and Slip - I
- Lecture 26 - Dislocations and Slip - II
- Lecture 27 - Dislocations and Peirells Nabarro Stress
- Lecture 28 - Dislocation Generation
- Lecture 29 - Dislocations and Strengthening

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- Lecture 30 - Strain Hardening
- Lecture 31 - Grain Boundary Strengthening
- Lecture 32 - Solid Solution Strengthening
- Lecture 33 - Precipitation Hardening
- Lecture 34 - Electrical Conduction in Metals
- Lecture 35 - Free Electron Theory
- Lecture 36 - Fermi-Dirac Statistics and Electronic conductivity of Metals
- Lecture 37 - Fundamental of Semiconductors
- Lecture 38 - Band Theory
- Lecture 39 - Intrinsic Semiconductors
- Lecture 40 - Extrinsic Semiconductors

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Diffusion in Multicomponent Solids

Subject Co-ordinator - Prof. Kaustubh Kulkarni

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction to the Course and Thermodynamics Refresher

Lecture 2 - The Second law of Thermodynamics

Lecture 3 - Application of Second law and Illustration of Intermixing as Irreversible Process

Lecture 4 - Equilibrium, Stability and Phase Diagrams in Single Component Systems

Lecture 5 - Third Law of Thermodynamics and Numerical Examples

Lecture 6 - Thermodynamic Activity and Gibbs Free Energy of Mixing

Lecture 7 - Entropy of mixing of Multicomponent Ideal Solution

Lecture 8 - Regular Solution Model: Application to Ternary System

Lecture 9 - Gibbs Free Energy-Composition Curves, Phase Diagrams and Gibbs Phase rule

Lecture 10 - Exercise: Solution Thermodynamics

Lecture 11 - Driving force for Diffusion, Chemical Potentials and Concentrations

Lecture 12 - Diffusion flux and Frames of Reference

Lecture 13 - Fick's Law

Lecture 14 - Exercise: Deriving Sigma Cosine for any Cubic Lattice

Lecture 15 - Fick's Law for Multicomponent Diffusion

Lecture 16 - Diffusion Equation and Solution to Steady State Diffusion

Lecture 17 - Conversion of Set of Interdiffusion Coefficients from One Dependent Compared to Another

Lecture 18 - Refresher on Laplace Transform

Lecture 19 - Error Function and Its Laplace transform

Lecture 20 - Instantaneous Planar Source: Solution to Diffusion Equation and Its Applications

Lecture 21 - Solution to Diffusion Equation for Semi-Infinite Slab and Its Application in Carburizing of Steel

Lecture 22 - Solution to Diffusion Equation for Binary Diffusion Couple

Lecture 23 - Solution to Diffusion Equation for Multicomponent Diffusion Couple

Lecture 24 - Nature of Concentration Profiles in Binary and Multicomponent Diffusion Couples

Lecture 25 - Numerical Problems

Lecture 26 - Homogenization of Multicomponent alloys

Lecture 27 - Solution to Diffusion Equation: Periodic Boundary Conditions

Lecture 28 - Energetics of Vacancy Formation

Lecture 29 - Experimental Determination of Enthalpy of Vacancy Formation

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- Lecture 30 - Mechanisms of Diffusion in Metals and Alloys
- Lecture 31 - Point Defects in Intermetallics and Ionic Compounds
- Lecture 32 - Diffusion Mechanisms in Intermetallics
- Lecture 33 - Theory of Random Walk: Mean Squared Displacement
- Lecture 34 - Physical Significance of Diffusivity: Einstein-Smoluchowski Equation
- Lecture 35 - Derivation of Correlation Factors in Cubic Crystals by Vacancy Mechanism
- Lecture 36 - Correlation Factors for Substitutional Diffusion by Vacancy Mechanism in FCC Crystal
- Lecture 37 - Correlation Effects in BCC and Diamond Cubic for Vacancy Mechanism
- Lecture 38 - Practice Problems
- Lecture 39 - Deriving Relation Between Diffusion Flux and Chemical Potential Gradients
- Lecture 40 - Atomic Mobility, Diffusivity and Diffusion Under External Driving Force
- Lecture 41 - Non-Ideality as Driving Force
- Lecture 42 - Theory of diffusion
- Lecture 43 - Experimental Determination of Interdiffusion Coefficients: Boltzmann Matano Analysis
- Lecture 44 - Analysis of Interdiffusion Fluxes in Multicomponent Diffusion Couples
- Lecture 45 - Various Techniques for Experimental Determination of Multicomponent Interdiffusion Coefficients
- Lecture 46 - Experimental Determination of Interdiffusion Coefficients: Examples from Literature
- Lecture 47 - Intrinsic Diffusion and Kirkendall Effect
- Lecture 48 - Experimental Determination of Intrinsic Diffusion Coefficients
- Lecture 49 - A Brief Introduction to Ternary Phase Diagram
- Lecture 50 - Multiphase Diffusion: Diffusion Paths and Diffusion Structures
- Lecture 51 - Interdiffusion Analysis of Multiphase Diffusion Couples

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Corrosion Failures and Analysis

Subject Co-ordinator - Prof. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - An introduction to corrosion failure and analysis
- Lecture 2 - Various forms of corrosion
- Lecture 3 - Discussion of various factors affecting corrosion
- Lecture 4 - Forms of corrosion: Uniform corrosion - Part 1
- Lecture 5 - Forms of corrosion: Uniform corrosion - Part 2
- Lecture 6 - Galvanic corrosion - I
- Lecture 7 - Galvanic corrosion - II
- Lecture 8 - Galvanic corrosion - III
- Lecture 9 - Galvanic corrosion - IV
- Lecture 10 - Importance of galvanic series
- Lecture 11 - Factors associated with galvanic corrosion: Case study 1
- Lecture 12 - Factors associated with galvanic corrosion: Case study 2
- Lecture 13 - Factors associated with galvanic corrosion: Case study 3
- Lecture 14 - Preventive measures and advantages of galvanic corrosion
- Lecture 15 - Dealloying/Selective leaching
- Lecture 16 - Dealloying or selective leaching: Mechanism
- Lecture 17 - Dealloying or selective leaching: Applications and protection methods
- Lecture 18 - Graphitic corrosion and protection from dezincification
- Lecture 19 - Intergranular Corrosion
- Lecture 20 - Intergranular corrosion in case of 304, 321 and 347 stainless steel
- Lecture 21 - Intergranular Corrosion: Sensitization and Weld Decay
- Lecture 22 - Intergranular Corrosion: Control of Sensitization - Weld Decay
- Lecture 23 - Intergranular Corrosion: Knife Line Attack and Prevention Methods
- Lecture 24 - Crevice Corrosion: Introduction
- Lecture 25 - Crevice Corrosion: Mechanism
- Lecture 26 - Crevice corrosion: Mechanism and Various stages
- Lecture 27 - Crevice corrosion: Case studies and Protection methods
- Lecture 28 - Pitting corrosion: Introduction and Case studies
- Lecture 29 - Various conditions favouring pitting corrosion - I

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- Lecture 30 - Various conditions favouring pitting corrosion - II
- Lecture 31 - Various conditions favouring pitting corrosion - III
- Lecture 32 - Pitting Corrosion: Mechanism and Protection
- Lecture 33 - Erosion Corrosion: Introduction
- Lecture 34 - Erosion Corrosion: Characteristics
- Lecture 35 - Erosion Corrosion: Protection methods and cavitation corrosion
- Lecture 36 - Cavitation corrosion and its case studies
- Lecture 37 - Cavitation corrosion, Fretting corrosion and their preventive measures
- Lecture 38 - Environmental cracking or stress assisted corrosion failures
- Lecture 39 - Stress corrosion cracking: Mechanism - I
- Lecture 40 - Stress corrosion cracking: Mechanism - II
- Lecture 41 - Stress corrosion cracking: Mechanism - III
- Lecture 42 - Stress corrosion cracking: Corrosion fatigue and protection methods

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Nanomaterials and their Properties

Subject Co-ordinator - Prof. Krishanu Biswas

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Nanomaterials: An Overview - Part I
- Lecture 2 - Nanomaterials: An Overview - Part II
- Lecture 3 - Nanomaterials: Hierarchical Nanostructures - I
- Lecture 4 - Nanomaterials: Hierarchical Nanostructures - II
- Lecture 5 - Nanomaterials: Surfaces and Interfaces - I
- Lecture 6 - Nanomaterials: Surfaces and Interfaces - I (Continued...)
- Lecture 7 - Nanomaterials: Surfaces - I
- Lecture 8 - Nanomaterials: Magic Numbers
- Lecture 9 - Thermodynamics of Nanomaterials
- Lecture 10 - Surfaces and Interfaces - II
- Lecture 11 - Thermodynamics of Nanomaterials
- Lecture 12 - Surfaces and Interfaces - II (Continued...)
- Lecture 13 - Nanophase Diagrams
- Lecture 14 - Effect of Size on Phase Diagrams
- Lecture 15 - Synthesis of Nanomaterials
- Lecture 16 - Synthesis Routes of Nanomaterials - II
- Lecture 17 - Mechanical Properties of Nanomaterials - I
- Lecture 18 - Mechanical Properties of Nanomaterials - II
- Lecture 19 - Thermal Properties of Nanomaterials - I
- Lecture 20 - Thermal Properties of Nanomaterials - II
- Lecture 21 - Thermal Properties of Nanomaterials - III
- Lecture 22 - Thermal Properties of Nanomaterials - III (Continued...)
- Lecture 23 - Electrical Property of Nanomaterials
- Lecture 24 - Magnetic Properties of Nanomaterials - I
- Lecture 25 - Magnetic Properties of Nanomaterials - II
- Lecture 26 - Optical Properties of Nanomaterials - I
- Lecture 27 - Optical Properties of Nanomaterials - II
- Lecture 28 - Special Cases: Carbon-Based Nanomaterials
- Lecture 29 - Special Cases: Polymer-Based Nanomaterials

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NPTEL Video Course - Metallurgy and Material Science - Advanced ceramics for strategic applications

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

Co-ordinating Institute - Central Glass and Ceramic Research Institute

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

- Lecture 1 - Introduction
- Lecture 2 - Introduction (Continued...)
- Lecture 3 - Crystal Structure
- Lecture 4 - Crystal Structure (Continued...)
- Lecture 5 - Crystal Structure (Continued...)
- Lecture 6 - Crystal Structure (Continued...)
- Lecture 7 - Defects in crystalline solids
- Lecture 8 - Defects in crystalline solids (Continued...)
- Lecture 9 - Dislocation
- Lecture 10 - Two and Three Dimensional Defects
- Lecture 11 - Electrical Conduction in ceramics
- Lecture 12 - Electrical Conduction in Ceramics (Continued...)
- Lecture 13 - Electrical Conduction in Ceramics (Continued...)
- Lecture 14 - Electrical Conduction in Ceramics (Continued...)
- Lecture 15 - Electrical Conduction in Ceramics (Continued...)
- Lecture 16 - Electrical Conduction in Ceramics (Continued...)
- Lecture 17 - Electrical Phenomenon in Insulators
- Lecture 18 - Electrical Phenomenon in Insulators (Continued...)
- Lecture 19 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics
- Lecture 20 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics (Continued...)
- Lecture 21 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics (Continued...)
- Lecture 22 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics (Continued...)
- Lecture 23 - Relaxor Ferroelectric
- Lecture 24 - Superconductivity
- Lecture 25 - Superconductivity (Continued...)
- Lecture 26 - Ceramic Gas Sensor
- Lecture 27 - Ceramic Gas Sensor (Continued...)
- Lecture 28 - Solid Oxide Fuel Cell
- Lecture 29 - Solid Oxide Fuel Cell (Continued...)

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- Lecture 30 - Solid Oxide Fuel Cell (Continued...)
- Lecture 31 - Hydrogen Generation through MIEC Reactor
- Lecture 32 - Lithium Ion Battery
- Lecture 33 - Lithium Ion Battery (Continued...)
- Lecture 34 - Magnetic Ceramics
- Lecture 35 - Magnetic Ceramics (Continued...)
- Lecture 36 - Magnetic Ceramics (Continued...)
- Lecture 37 - Magnetic Ceramics (Continued...)
- Lecture 38 - Sintering of Ceramics
- Lecture 39 - Sintering of Ceramics (Continued...)
- Lecture 40 - Sintering of Ceramics (Continued...)
- Lecture 41 - Sintering of Ceramics (Continued...)
- Lecture 42 - Mechanical Properties of Ceramic Materials
- Lecture 43 - Mechanical Properties of Ceramic Materials (Continued...)
- Lecture 44 - Mechanical Properties of Ceramic Materials (Continued...)
- Lecture 45 - Mechanical Properties of Ceramic Materials (Continued...)
- Lecture 46 - Structural Ceramics Materials
- Lecture 47 - Bioceramics

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

NPTEL Video Course - Metallurgy and Material Science - Non-ferrous Extractive Metallurgy

Subject Co-ordinator - Prof. H.S. Ray, Mr. L. Pugazhenthay

Co-ordinating Institute - IIT - Kharagpur | India Lead Zine Development Association

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

- Lecture 1 - Brief History of Non-ferrous Metal
- Lecture 2 - Brief History of Non-ferrous Metal (Continued...)
- Lecture 3 - Sources of Non-ferrous Metal
- Lecture 4 - Mineral Beneficiation Techniques
- Lecture 5 - General Methods of Metal Extraction
- Lecture 6 - Principles of Carbon Reduction
- Lecture 7 - Principles of Hydrometallurgy
- Lecture 8 - Principles of Electrometallurgy
- Lecture 9 - Electrometallurgy (Continued...) and Temkin Model for Fused Salts
- Lecture 10 - Refining of Metals - Chemical Methods
- Lecture 11 - Refining of Metals - Physical Methods
- Lecture 12 - Concluding part of Module - 4
- Lecture 13 - Concluding part of Module - 4 (Continued...)
- Lecture 14 - Module - 5 Extraction of Metals from Oxides, Extraction of Magnesium
- Lecture 15 - Extraction Aluminium
- Lecture 16 - Extraction Aluminium (Continued...1)
- Lecture 17 - Extraction Aluminium (Continued...2)
- Lecture 18 - Extraction Aluminium (Continued...3)
- Lecture 19 - Extraction of Tin
- Lecture 20 - Extraction of Ferro Alloys
- Lecture 21 - Module - 6 Extraction of Metals from Sulphides Extraction of Copper
- Lecture 22 - Extraction of Copper (Continued...)
- Lecture 23 - Hydrometallurgy of Copper
- Lecture 24 - Extraction of Lead
- Lecture 25 - Extraction of Zinc-Imperial Smelting Process
- Lecture 26 - Module - 7 Extraction of metals from halides, Extraction of reactor metals
- Lecture 27 - Extraction of reactor metals (Continued...1)
- Lecture 28 - Extraction of reactor metals (Continued...2)
- Lecture 29 - Extraction of Titanium

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- Lecture 30 - Extraction of Precious Metals
- Lecture 31 - Production of Secondary Metals and Treatment of Wastes
- Lecture 32 - Energy and Environment Related Issues in Nonferrous Metals Production
- Lecture 33 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...1)
- Lecture 34 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...2)
- Lecture 35 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...3)
- Lecture 36 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...4)
- Lecture 37 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...5)
- Lecture 38 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...6)
- Lecture 39 - Nonferrous Metals in India - Unleashing its true potential
- Lecture 40 - Nonferrous Metals in India - Unleashing its true potential (Continued...)
- Lecture 41 - Review and Summary
- Lecture 42 - Review and Summary (Continued...1)
- Lecture 43 - Review and Summary (Continued...2)

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

NPTEL Video Course - Metallurgy and Material Science - Principles of Physical Metallurgy

Subject Co-ordinator - Prof. R.N. Ghosh

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction
- Lecture 2 - Atomic Bond and Crystal Structure
- Lecture 3 - Atomic Bond and Crystal Structure (Continued...1)
- Lecture 4 - Atomic Bond and Crystal Structure (Continued...2)
- Lecture 5 - Experimental Tools & Techniques
- Lecture 6 - Experimental Tools & Techniques (Continued...)
- Lecture 7 - Solidification of Pure Metal
- Lecture 8 - Plastic Deformation of Pure Metal
- Lecture 9 - Plastic Deformation of Pure Metal (Continued...)
- Lecture 10 - Crystal Defects in Metals
- Lecture 11 - Crystal Defects in Metals (Continued...1)
- Lecture 12 - Crystal Defects in Metals (Continued...2)
- Lecture 13 - Crystal Defects in Metals (Continued...3)
- Lecture 14 - Crystal Defects in Metals (Continued...4)
- Lecture 15 - Diffusion in Solids
- Lecture 16 - Diffusion in Solids (Continued...)
- Lecture 17 - Numerical Examples in Diffusion
- Lecture 18 - Solidification of Binary Alloys
- Lecture 19 - Solidification of Binary Alloys (Continued...1)
- Lecture 20 - Solidification of Binary Alloys (Continued...2)
- Lecture 21 - Solidification of Binary Alloys (Continued...3)
- Lecture 22 - Solidification of Binary Alloys (Continued...4)
- Lecture 23 - Iron-Carbon Phase Diagram
- Lecture 24 - Iron-Carbon Phase Diagram (Continued...)
- Lecture 25 - Ternary Phase Diagram
- Lecture 26 - Common Binary Alloys
- Lecture 27 - Metal Working
- Lecture 28 - Metal Working
- Lecture 29 - Precipitation for Solid Solution

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

- Lecture 30 - Precipitation for Solid Solution (Continued...)
- Lecture 31 - Heat Treatment of Steel
- Lecture 32 - Heat Treatment of Steel (Continued...1)
- Lecture 33 - Heat Treatment of Steel (Continued...2)
- Lecture 34 - Heat Treatment of Steel (Continued...3)
- Lecture 35 - Heat Treatment of Steel (Continued...4)
- Lecture 36 - Heat Treatment of Steel (Continued...5)
- Lecture 37 - Surface Hardening
- Lecture 38 - Structural Steel
- Lecture 39 - Structural Steel (Continued...)
- Lecture 40 - Ultra High Strength Steel
- Lecture 41 - Preferred Orientation
- Lecture 42 - Metal Joining

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

NPTEL Video Course - Metallurgy and Material Science - Processing of Semiconducting Materials

Subject Co-ordinator - Dr. Pallab Banerji

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction to Electronics Materials
Lecture 2 - Electrical Conductivity of Materials
Lecture 3 - Direct and Indirect Band Semiconductors
Lecture 4 - Doping in Semiconductors
Lecture 5 - Semiconductor Statistics
Lecture 6 - Importance of Doping
Lecture 7 - Diffusion and Ion Implantation - I
Lecture 8 - Diffusion and Ion Implantation - II
Lecture 9 - Diffusion and Ion Implantation - III
Lecture 10 - Elemental Semiconductors
Lecture 11 - Compound Semiconductors
Lecture 12 - Bulk Crystal Growth - I
Lecture 13 - Bulk Crystal Growth - II
Lecture 14 - Ga As Crystal Growth
Lecture 15 - Defects in Crystals - I
Lecture 16 - Defects in Crystals - II
Lecture 17 - Band Gap Engineering - I
Lecture 18 - Band Gap Engineering - II
Lecture 19 - Chemical Vapour Deposition - I
Lecture 20 - Chemical Vapour Deposition - II
Lecture 21 - MOCVD
Lecture 22 - Molecular Beam Epitaxy - I
Lecture 23 - Molecular Beam Epitaxy - II
Lecture 24 - p - n Junction
Lecture 25 - Carrier Transport in P - N Junction
Lecture 26 - Characterization - I
Lecture 27 - Characterization - II
Lecture 28 - Optical Characterization - I
Lecture 29 - Metal-Semiconductor Contact - I

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

- Lecture 30 - Metal-Semiconductor Contact - II
- Lecture 31 - Applications of Metal-Semiconductor Contact
- Lecture 32 - Oxidation - I
- Lecture 33 - Oxidation - II
- Lecture 34 - Different Types of Semiconductor - I
- Lecture 35 - Oxidation - I
- Lecture 36 - Oxidation - II
- Lecture 37 - Dielectric Films
- Lecture 38 - Low - K and High - K materials
- Lecture 39 - Metallization
- Lecture 40 - Materials for Photovoltaics

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

NPTEL Video Course - Metallurgy and Material Science - Science and Technology of Polymers

Subject Co-ordinator - Prof. B. Adhikari

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Basic Concepts on Polymers
- Lecture 2 - Basic Concepts on Polymers (Continued...)
- Lecture 3 - Basic Concepts on Polymers (Continued...)
- Lecture 4 - Polymer Raw Materials
- Lecture 5 - Principles of Polymer Synthesis
- Lecture 6 - Principles of Polymer Synthesis (Continued...)
- Lecture 7 - Principles of Polymer Synthesis (Continued...)
- Lecture 8 - Principles of Polymer Synthesis (Continued...)
- Lecture 9 - Principles of Polymer Synthesis (Continued...)
- Lecture 10 - Principles of Polymer Synthesis (Continued...)
- Lecture 11 - Structure and Properties of Polymers (Continued...)
- Lecture 12 - Structure and Properties of Polymers (Continued...)
- Lecture 13 - Structure and Properties of Polymers (Continued...)
- Lecture 14 - Structure and Properties of Polymers (Continued...)
- Lecture 15 - Polymerization Techniques
- Lecture 16 - Polymerization Techniques (Continued...)
- Lecture 17 - Polymerization Techniques (Continued...)
- Lecture 18 - Polymer Products
- Lecture 19 - Polymer Products (Continued...)
- Lecture 20 - Rubber Products
- Lecture 21 - Rubber Products (Continued...)
- Lecture 22 - Conducting Polymers
- Lecture 23 - Conducting Polymers (Continued...)
- Lecture 24 - Liquid Crystalline Polymers
- Lecture 25 - Stimuli Responsive Polymer and its application
- Lecture 26 - Stimuli Responsive Polymer and its application (Continued...)
- Lecture 27 - Polymeric Nanomaterials and Devices (Continued...)
- Lecture 28 - Polymeric Nanomaterials and Devices (Continued...)
- Lecture 29 - Polymeric Nanomaterials and Devices (Continued...)

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

- Lecture 30 - Environmental Degradation of Polymers
- Lecture 31 - Environmental Degradation of Polymers (Continued...)
- Lecture 32 - Polymer Composites
- Lecture 33 - Polymer Composites (Continued...)
- Lecture 34 - Polymer Composites (Continued...)
- Lecture 35 - Multicomponent Polymeric Materials
- Lecture 36 - Multicomponent Polymeric Materials (Continued...)
- Lecture 37 - Multicomponent Polymeric Materials (Continued...)
- Lecture 38 - Viscoelasticity
- Lecture 39 - Engineering and Speciality Polymers
- Lecture 40 - Engineering and Speciality Polymers (Continued...)

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

NPTEL Video Course - Metallurgy and Material Science - Advanced Materials and Processes

Subject Co-ordinator - Prof. B.S. Murty

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Structure of Materials - Part I
Lecture 2 - Structure of Materials - Part II
Lecture 3 - Nano Crystalline Materials - Part I
Lecture 4 - Nano Crystalline Materials - Part II
Lecture 5 - Nano Crystalline Materials - Part III
Lecture 6 - Nano Crystalline Materials - Part IV
Lecture 7 - Amorphous Materials - Part I
Lecture 8 - Amorphous Materials - Part II
Lecture 9 - Amorphous Materials - Part III
Lecture 10 - Amorphous Materials - Part IV
Lecture 11 - Amorphous Materials - Part V
Lecture 12 - Quasicrystals - Part I
Lecture 13 - Quasicrystals - Part II
Lecture 14 - Nano Quasicrystals - Part I
Lecture 15 - Nano Quasicrystals - Part II
Lecture 16 - Rapid Solidification Processing
Lecture 17 - Mechanical Alloying
Lecture 18 - Advanced AI Alloys - Part I
Lecture 19 - Advanced AI Alloys - Part II
Lecture 20 - Advanced AI Alloys - Part III
Lecture 21 - Advanced AI Alloys - Part IV and Ti Alloys
Lecture 22 - Shape Memory Alloys
Lecture 23 - Strengthening Mechanisms - Part I
Lecture 24 - Strengthening Mechanisms - Part II
Lecture 25 - Superalloys
Lecture 26 - In-Situ Composites - Part I

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Principles of Polymer Synthesis

Subject Co-ordinator - Prof. Rajat K Das

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Historical development of polymer science
- Lecture 2 - Molecular Weight Determination Of Polymers
- Lecture 3 - Molecular Weight Determination Of Polymers (Continued...)
- Lecture 4 - Molecular Weight Determination of Polymers (Continued...)
- Lecture 5 - Molecular Weight Determination of Polymers (Continued...)
- Lecture 6 - Principles of step growth polymerization
- Lecture 7 - Principles of step growth polymerization (Continued...)
- Lecture 8 - Principles of step growth polymerization (Continued...)
- Lecture 9 - Principles of step growth polymerization (Continued...)
- Lecture 10 - Principles of step growth polymerization (Continued...)
- Lecture 11 - Principles of radical chain polymerization
- Lecture 12 - Principles of radical chain polymerization (Continued...)
- Lecture 13 - Principles of radical chain polymerization (Continued...)
- Lecture 14 - Principles of radical chain polymerization (Continued...)
- Lecture 15 - Principles of radical chain polymerization (Continued...)
- Lecture 16 - Principles of radical chain polymerization (Continued...)
- Lecture 17 - Principles of Chain Copolymerization
- Lecture 18 - Principles of Chain Copolymerization (Continued...)
- Lecture 19 - Principles of Chain Copolymerization (Continued...)
- Lecture 20 - Principles of Living Chain polymerization
- Lecture 21 - Principles of Living Chain polymerization (Continued...)
- Lecture 22 - Design of Chemical Reactors
- Lecture 23 - Design of Chemical Reactors (Continued...)
- Lecture 24 - Design of Chemical Reactors (Continued...)
- Lecture 25 - Design of Chemical Reactors (Continued...)
- Lecture 26 - Design of Chemical Reactors (Continued...)
- Lecture 27 - Design of Chemical Reactors (Continued...)
- Lecture 28 - Design of Chemical Reactors (Continued...)
- Lecture 29 - Design of Chemical Reactors (Continued...)

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

- Lecture 30 - Design of Chemical Reactors (Continued...)
- Lecture 31 - Design of Chemical Reactors (Continued...)
- Lecture 32 - Synthesis of industrial polymers
- Lecture 33 - Synthesis of industrial polymers (Continued...)
- Lecture 34 - Synthesis of industrial polymers (Continued...)
- Lecture 35 - Synthesis of industrial polymers (Continued...)
- Lecture 36 - Synthesis of industrial polymers (Continued...)
- Lecture 37 - Synthesis of industrial polymers (Continued...)
- Lecture 38 - Synthesis of industrial polymers (Continued...)
- Lecture 39 - Synthesis of industrial polymers (Continued...)
- Lecture 40 - Synthesis of industrial polymers (Continued...)
- Lecture 41 - Synthesis of industrial polymers (Continued...)
- Lecture 42 - Synthesis of industrial polymers (Continued...)
- Lecture 43 - Synthesis of industrial polymers (Continued...)
- Lecture 44 - Synthesis of industrial polymers (Continued...)
- Lecture 45 - Synthesis of industrial polymers (Continued...)
- Lecture 46 - Synthesis of industrial polymers (Continued...)
- Lecture 47 - Synthesis of industrial polymers (Continued...)

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Advanced Materials and Processes

Subject Co-ordinator - Prof. Jayanta Das

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction
Lecture 2 - Introduction (Continued...)
Lecture 3 - Introduction (Continued...)
Lecture 4 - Introduction (Continued...)
Lecture 5 - Introduction (Continued...)
Lecture 6 - Bulk Metallic Glass, Glassy and Amorphous Materials
Lecture 7 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 8 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 9 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 10 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 11 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 12 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 13 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 14 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 15 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)
Lecture 16 - Shape Memory Alloys
Lecture 17 - Shape Memory Alloys (Continued...)
Lecture 18 - Shape Memory Alloys (Continued...)
Lecture 19 - Shape Memory Alloys (Continued...)
Lecture 20 - Shape Memory Alloys (Continued...)
Lecture 21 - Shape Memory Alloys
Lecture 22 - Shape Memory Alloys
Lecture 23 - Shape Memory Alloys
Lecture 24 - Shape Memory Alloys
Lecture 25 - Shape Memory Alloys
Lecture 26 - Introduction of High Temperature Materials
Lecture 27 - Introduction of High Temperature Materials (Continued...)
Lecture 28 - Introduction of High Temperature Materials (Continued...)
Lecture 29 - Introduction of High Temperature Materials (Continued...)

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

- Lecture 30 - Introduction of High Temperature Materials (Continued...)
- Lecture 31 - Superalloys
- Lecture 32 - Superalloys (Continued...)
- Lecture 33 - Superalloys (Continued...)
- Lecture 34 - Superalloys (Continued...)
- Lecture 35 - Superalloys (Continued...)
- Lecture 36 - Nanomaterials
- Lecture 37 - Nanomaterials
- Lecture 38 - Nanomaterials
- Lecture 39 - Nanomaterials
- Lecture 40 - Nanomaterials
- Lecture 41 - Nanomaterials
- Lecture 42 - Nanomaterials
- Lecture 43 - Nanomaterials
- Lecture 44 - Nanomaterials
- Lecture 45 - Nanomaterials
- Lecture 46 - Soft and Hard Magnetic Materials
- Lecture 47 - Soft and Hard Magnetic Materials (Continued...)
- Lecture 48 - Soft and Hard Magnetic Materials (Continued...)
- Lecture 49 - Soft and Hard Magnetic Materials (Continued...)
- Lecture 50 - Soft and Hard Magnetic Materials (Continued...)
- Lecture 51 - Advanced Processes
- Lecture 52 - Advanced Processes (Continued...)
- Lecture 53 - Advanced Processes (Continued...)
- Lecture 54 - Advanced Processes (Continued...)
- Lecture 55 - Advanced Processes (Continued...)
- Lecture 56 - Advanced Functional Alloys
- Lecture 57 - Advanced Functional Alloys (Continued...)
- Lecture 58 - Advanced Functional Alloys (Continued...)
- Lecture 59 - Advanced Functional Alloys (Continued...)
- Lecture 60 - Advanced Functional Alloys (Continued...)

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Surface Engineering for Corrosion and Wear Resista

Subject Co-ordinator - Prof. Jyotsna Dutta Majumder, Prof. I. Manna

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Structure of Solids

Lecture 2 - Microstructure of Solids

Lecture 3 - Defects in Crystalline Solids

Lecture 4 - Surface and Surface Energy

Lecture 5 - Surface Properties-due to mechanical activation

Lecture 6 - Surface dependent physical and chemical property

Lecture 7 - Surface Dependent Properties and Surface initiated Degradation

Lecture 8 - Fatigue

Lecture 9 - Wear Part - I

Lecture 10 - Wear Part - II

Lecture 11 - Wear Part - III

Lecture 12 - Corrosion - I

Lecture 13 - Corrosion - II

Lecture 14 - Corrosion - III

Lecture 15 - Corrosion - IV

Lecture 16 - Corrosion - V

Lecture 17 - Classification of Surface engineering

Lecture 18 - Strengthening of metals

Lecture 19 - Strengthening of Non-Metals

Lecture 20 - Diffusive transformation in Steel

Lecture 21 - Non-Diffusive transformation in Steel

Lecture 22 - Shot Peening

Lecture 23 - Shot Peening and Rolling

Lecture 24 - Flame Hardening and Induction Hardening

Lecture 25 - Case Carburizing

Lecture 26 - Liquid Carburizing and Gas Carburizing

Lecture 27 - Gas Nitriding

Lecture 28 - Liquid and Salt Bath Nitriding

Lecture 29 - Plasma Nitriding and Ion Implantation

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

- Lecture 30 - Heat treatment after carburizing and Nitriding
- Lecture 31 - Diffusion Coating Principle
- Lecture 32 - Diffusion Coating Processes
- Lecture 33 - Thick Coating by Cladding
- Lecture 34 - High Temperature Degradation
- Lecture 35 - Corrosion Prevention
- Lecture 36 - Chemical Conversion Coating
- Lecture 37 - Electroconversion Coating
- Lecture 38 - Electro and Electroless Deposition Process
- Lecture 39 - Hot Dipping - I
- Lecture 40 - Hot Dipping - II
- Lecture 41 - Thermal Spray Deposition - I
- Lecture 42 - Thermal Spray Deposition - II
- Lecture 43 - Thermal Spray Deposition - III
- Lecture 44 - Thermal Spray Deposition - IV
- Lecture 45 - Physical Vapor Deposition (PVD)
- Lecture 46 - Sputtering
- Lecture 47 - Chemical Vapor Deposition (CVD)
- Lecture 48 - Composite Coating
- Lecture 49 - Ion Implantation - I
- Lecture 50 - Ion Implantation - II
- Lecture 51 - Electron Beam Welding
- Lecture 52 - Electron Beam Surface engineering
- Lecture 53 - Laser Materials Processing
- Lecture 54 - Laser Assisted Materials Processing
- Lecture 55 - Laser Surface Engineering
- Lecture 56 - Laser Surface Engineering with Laser surface hardening and laser surface melting
- Lecture 57 - Laser Surface Alloying
- Lecture 58 - Laser Surface Cladding
- Lecture 59 - Surface Damage - Case Studies
- Lecture 60 - Overview and Conclusion

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Ironmaking and Steelmaking

Subject Co-ordinator - Prof. Gour Gopal Roy

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction
- Lecture 2 - Various Routes of steelmaking
- Lecture 3 - The Iron Blast Furnace
- Lecture 4 - Thermodynamics of BF ironmaking
- Lecture 5 - Thermodynamics of BF Ironmaking (Continued...)
- Lecture 6 - Overall Heat and Material Balance in Blast Furnace
- Lecture 7 - RIST Diagram based on overall heat and material balance
- Lecture 8 - RIST Diagram based on heat and material balance in the Wustite Reserve Zone
- Lecture 9 - Kinetics of gas solid reaction
- Lecture 10 - Kinetics of gas solid reaction
- Lecture 11 - Aerodynamics in Blast Furnace - Part 1
- Lecture 12 - Aerodynamics in Blast Furnace - Part 2
- Lecture 13 - Aerodynamics in Blast Furnace - Part 3
- Lecture 14 - Coke rate and Fuel efficiency in Blast Furnace
- Lecture 15 - oxygen enrichment of blast
- Lecture 16 - Blast Furnace and it's Raw Material
- Lecture 17 - Sintering of Iron Ore
- Lecture 18 - Pelletization of Iron Ore
- Lecture 19 - Coking Process
- Lecture 20 - Testing of Burden Material
- Lecture 21 - Burden Distribution
- Lecture 22 - Blast Furnace products and their utilization
- Lecture 23 - Blast Furnace Productivity
- Lecture 24 - Modeling of Blast Furnace
- Lecture 25 - New Potential Technologies for Blast Furnace
- Lecture 26 - History of Steelmaking
- Lecture 27 - Properties of slag
- Lecture 28 - The Reaction Equilibria Unlisted
- Lecture 29 - Dephosphorization of liquid steel

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- Lecture 30 - Kinetics of slag metal reaction
- Lecture 31 - LD steelmaking
- Lecture 32 - LD Steel making
- Lecture 33 - Evolution of impurities in steel and slag constituents during LD processing
- Lecture 34 - Hybrid Processes
- Lecture 35 - Electric steel making
- Lecture 36 - Secondary Steel making
- Lecture 37 - Secondary Steel making
- Lecture 38 - Secondary Steel making
- Lecture 39 - Homogenization and Gas stirred ladle
- Lecture 40 - Ladle de-sulphurization, alloying, stainless steel making
- Lecture 41 - Inclusion and its control
- Lecture 42 - Injection Metallurgy
- Lecture 43 - Cored wire injection-Modeling, melting sequence, effect of operating parameters
- Lecture 44 - IM
- Lecture 45 - IM
- Lecture 46 - Casting fundamentals- Heat Transfer
- Lecture 47 - Casting fundamentals- segregation
- Lecture 48 - Morphology of solidification structure and Ingot casting
- Lecture 49 - Continuous casting
- Lecture 50 - Downstream processing and near net shape casting
- Lecture 51 - Introduction to Direct Reduction (DR) and smelting Reduction (SR) Processes
- Lecture 52 - Introduction to Direct Reduction (DR) and smelting Reduction (SR) Processes (Continued...)
- Lecture 53 - Coal Based DR Processes
- Lecture 54 - Coal Based DR Processes (Continued...)
- Lecture 55 - Gas based DR Processes
- Lecture 56 - Gas based DR Processes (Continued...)
- Lecture 57 - Smelting Reduction (SR) Processes
- Lecture 58 - Smelting Reduction (SR) Processes (Continued...)
- Lecture 59 - Ironmaking and Steelmaking in India
- Lecture 60 - Ironmaking and Steelmaking in India (Continued...)

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Non-Metallic Materials

Subject Co-ordinator - Prof. Subhasish Basu Majumder

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Classification and applications of non-metallic materials

Lecture 2 - Understanding on polymer structures

Lecture 3 - Characteristics of polymers and advanced polymeric materials

Lecture 4 - Processing of polymers

Lecture 5 - Polymer composites and issues related to recycling

Lecture 6 - Defects in crystalline materials: point, line, planar and three dimensional defects

Lecture 7 - Non- stoichiometry in non-metallic materials

Lecture 8 - Laws of thermodynamics, reaction kinetics - Part 1

Lecture 9 - Laws of thermodynamics, reaction kinetics - Part 2

Lecture 10 - Phase diagram and microstructure evolution in non-metallic materials

Lecture 11 - Carbonaceous materials

Lecture 12 - Fundamental of diffusion, Fick's laws, their solution and applications - Part 1

Lecture 13 - Fundamental of diffusion, Fick's laws, their solution and applications - Part 2

Lecture 14 - Phase transformation of non-metallic materials

Lecture 15 - Introduction to glass and amorphous solids

Lecture 16 - Understanding on conventional glass and amorphous solids

Lecture 17 - Glass-ceramics and specialty glasses

Lecture 18 - Mechanical properties of non-metallic materials, stress-strain response, elastic, and plastic deformation

Lecture 19 - Brittle and ductile materials, introduction to fracture mechanics, strength of brittle materials

Lecture 20 - Strengthening of materials, fatigue, and creep

Lecture 21 - Composite materials: Particle-reinforced composites, and fiber reinforced composites

Lecture 22 - Structural Composite

Lecture 23 - Dielectric and piezoelectric behavior

Lecture 24 - Ferroelectric Behaviour of Non-Metallic Materials and Ferroelectric thin film for Non-Volatile Memory

Lecture 25 - Magnetic Properties : Origin of Magnetism, Para, Dia, Ferro, and Ferrimagnetism

Lecture 26 - Ceramic Magnets and their Applications

Lecture 27 - Thermal Properties : Specific Heat, Heat Conduction, Thermal Diffusivity, Thermal expansion

Lecture 28 - Thermoelectric Effect and Magnetocaloric Effect

Lecture 29 - Optical properties: Refractive index, absorption and transmission of electromagnetic radiation,

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- Lecture 30 - Introduction to electrochemistry, Galvanic cells, Cell potentials and Gibbs Energy, Concentration
- Lecture 31 - Electrochemical storage, rechargeable batteries
- Lecture 32 - Introduction to electrochemical methods; cyclic voltammetry and other related techniques
- Lecture 33 - Fuel Cell and Energy harvesting
- Lecture 34 - Preparation of ceramic powders: auto-combustion, sol-gel synthesis, microwave assisted hydrothermal
- Lecture 35 - Introduction to sintering, sintering mechanism
- Lecture 36 - Solid-state sintering and microstructure development
- Lecture 37 - Solid-state sintering and microstructure development (Continued...)
- Lecture 38 - Liquid phase sintering and microstructure development, speciality sintering, reactive sintering
- Lecture 39 - Processing of glass and amorphous/non-crystalline solids
- Lecture 40 - Fundamental of thin film growth, growth mechanism and kinetics
- Lecture 41 - Thin film growth techniques, thermal evaporation, CVD, sputtering, CSD
- Lecture 42 - Fundamentals and processing of conducting and semiconducting ceramic devices
- Lecture 43 - Processing of ceramics devices
- Lecture 44 - Organic electronic materials: conducting polymers, semi-conducting organic materials, applications
- Lecture 45 - Thermal analyses
- Lecture 46 - Introduction of spectroscopic technique : UV-VIS spectroscopy
- Lecture 47 - Infra-red and Raman spectroscopy
- Lecture 48 - Optical and scanning electron microscopy
- Lecture 49 - X-ray photoelectron spectroscopy
- Lecture 50 - Measurement of mechanical properties, fracture toughness, MOR, hardness
- Lecture 51 - Ferroelectric thin film: synthesis and characterization
- Lecture 52 - Thermal analysis techniques: Differential scanning calorimetry and thermogravimetry
- Lecture 53 - Measurement of optical properties
- Lecture 54 - Novel ferroic composites: Synthesis and measurement
- Lecture 55 - Fundamentals of corrosion, corrosion of materials
- Lecture 56 - Oxidation, corrosion of ceramic materials, degradation of polymers: swelling and dissolution, biodegradation
- Lecture 57 - Ceramics in biology and medicine
- Lecture 58 - Design of Ceramics
- Lecture 59 - Finishing of Ceramics
- Lecture 60 - Fly-ash based glazed wall tiles: A case study

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Scanning Electron-Ion-Probe Microscopy in Material

Subject Co-ordinator - Prof. Debabrata Pradhan

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to Microscopy
- Lecture 2 - Scanning Electron Microscopy
- Lecture 3 - SEM and Its Capabilities
- Lecture 4 - Main Components of SEM - Electron Guns
- Lecture 5 - Main Components of SEM - Electron Guns and Electromagnetic Lenses
- Lecture 6 - Electron Probe Diameter Verses Electron Probe Current
- Lecture 7 - Electron Beam - Specimen Interaction
- Lecture 8 - Detectors
- Lecture 9 - BSE Detector and Sample Preparation for SEM
- Lecture 10 - Parameters Need to be Considered to obtain a Good SEM Image
- Lecture 11 - How to Get a Good SEM Image
- Lecture 12 - Additional Capabilities of SEM
- Lecture 13 - Additional Capabilities of SEM (Continued...)
- Lecture 14 - Additional Capabilities of SEM (Continued...)
- Lecture 15 - Scanning Ion Microscopy - An Introduction
- Lecture 16 - Ions Versus Electrons as Source for Microscopy
- Lecture 17 - Ions Source in HIM
- Lecture 18 - GFIS Properties and Ion Optical Column
- Lecture 19 - Ion Optical Column
- Lecture 20 - Ion-Solid Interactions and Signal Generation
- Lecture 21 - Signal Generation and Contrast Mechanism
- Lecture 22 - Contrast Mechanism and Imaging Modes
- Lecture 23 - Scanning Transmission Ion Microscopy and Microanalysis with HIM
- Lecture 24 - Creation and Modification of Materials by HIM
- Lecture 25 - Introduction to Scanning Probe Microscopy
- Lecture 26 - STM Instrumentation
- Lecture 27 - Main Components of STM
- Lecture 28 - Main Components of STM (Continued...)
- Lecture 29 - Main Components of STM (Continued...)

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- Lecture 30 - Working Principle of STM
- Lecture 31 - Operating Modes
- Lecture 32 - Scanning Tunneling Spectroscopy
- Lecture 33 - SPM - Atomic Force Microscopy (AFM)
- Lecture 34 - Force Between Tip and Sample in AFM
- Lecture 35 - Atomic Force Microscope - Parts
- Lecture 36 - Modes of AFM Operation
- Lecture 37 - Modes of AFM Operation (Continued...)
- Lecture 38 - AFM Imaging
- Lecture 39 - Phase Imaging, Noises and Resolution
- Lecture 40 - Surface Properties Measurements using Other Forces
- Lecture 41 - Surface Properties Measurements using AFM
- Lecture 42 - Manipulation of Atoms, Molecules and Industrial Applications
- Lecture 43 - Summary

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Techniques of Material Characterization

Subject Co-ordinator - Prof. Shibayan Roy

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to the course and basic principles of image formation
- Lecture 2 - Image formation, resolution, magnification, depth of field and depth of focus
- Lecture 3 - Aberrations in microscopy: General concepts
- Lecture 4 - Introduction, types and image formation in Optical microscopy
- Lecture 5 - Components of optical microscope
- Lecture 6 - Bright field and Dark field modes
- Lecture 7 - Phase contrast optical microscopy
- Lecture 8 - Polarized light microscopy
- Lecture 9 - Differential interference contrast
- Lecture 10 - Fluorescence microscopy
- Lecture 11 - Basic components of electron microscope
- Lecture 12 - Basic components of electron microscope (Continued...)
- Lecture 13 - Basic components of electron microscope (Continued...)
- Lecture 14 - Electron-material interaction
- Lecture 15 - Electron-material interaction (Continued...)
- Lecture 16 - Electron-material interaction (Continued...) and Image formation and contrast generation
- Lecture 17 - Modes of TEM (BF and DF)
- Lecture 18 - Modes of TEM
- Lecture 19 - Modes of TEM (Continued...) and Electron diffraction in TEM
- Lecture 20 - Electron diffraction in TEM
- Lecture 21 - Electron diffraction in TEM (Continued...)
- Lecture 22 - Electron diffraction in TEM (Continued...)
- Lecture 23 - Electron diffraction in TEM (Continued...)
- Lecture 24 - Electron diffraction in TEM (Continued...)
- Lecture 25 - Application of Electron diffraction
- Lecture 26 - Signal generation in SEM
- Lecture 27 - Signal generation in SEM (Continued...)
- Lecture 28 - Signal generation in SEM (Continued...)
- Lecture 29 - Signal generation in SEM (Continued...)

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

- Lecture 30 - Signal generation in SEM (Continued...)
- Lecture 31 - Basic components of SEM
- Lecture 32 - Basic components of SEM (Continued...)
- Lecture 33 - Optics of SEM
- Lecture 34 - Optics of SEM (Continued...)
- Lecture 35 - Optics of SEM (Continued...) and analytical detectors
- Lecture 36 - Analytical detectors in SEM
- Lecture 37 - Analytical (WDS) detector and contrast formation in SEM
- Lecture 38 - Imaging in SEM
- Lecture 39 - Imaging in SEM (Continued...)
- Lecture 40 - Imaging in SEM (Continued...)
- Lecture 41 - Imaging in SEM and X-ray diffraction
- Lecture 42 - Continuous and characteristics X-ray spectrum
- Lecture 43 - Characteristics X-ray radiation
- Lecture 44 - Characteristics X-ray radiation (Continued...) and X-ray absorption
- Lecture 45 - X-ray absorption (Continued...)
- Lecture 46 - X-ray absorption and filters
- Lecture 47 - Intensity of diffracted beam
- Lecture 48 - Intensity of diffracted beam (Continued...)
- Lecture 49 - Intensity of diffracted beam (Continued...)
- Lecture 50 - Intensity of diffracted beam (Continued...)
- Lecture 51 - Intensity of diffracted beam (Continued...)
- Lecture 52 - Intensity of diffracted beam (Continued...)
- Lecture 53 - Intensity of diffracted beam (Continued...)
- Lecture 54 - Intensity of diffracted beam (Continued...)
- Lecture 55 - Intensity of diffracted beam (Continued...)
- Lecture 56 - Intensity of diffracted beam (Continued...) and X-ray diffraction profile and analysis
- Lecture 57 - X-ray diffraction profile and analysis
- Lecture 58 - X-ray diffraction profile and analysis (Continued...)
- Lecture 59 - X-ray diffraction profile and analysis (Continued...)
- Lecture 60 - Electron backscatter diffraction (EBSD)

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Electrochemical Energy Storage

Subject Co-ordinator - Prof. Subhasish Basu Majumder

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Fundamentals of electrochemistry, definition of primary and secondary batteries
- Lecture 2 - Primary batteries and Secondary batteries
- Lecture 3 - Supercapacitors
- Lecture 4 - Concepts of thermodynamics pertinent to electrochemical cells
- Lecture 5 - Kinetics of electrochemical cells and structural characteristics of electrodes
- Lecture 6 - Introduction to EMF, redox potential, Faraday law and Nernst's law
- Lecture 7 - Terminology related to secondary battery : half-cell, full-cell, redox couple, positive
- Lecture 8 - Measurements: Cyclic voltammetry, nominal voltage, capacity, rate performance
- Lecture 9 - Impedance spectroscopy measurement and analyses
- Lecture 10 - Measurement of rechargeable cell: Case study
- Lecture 11 - History and categories of lithium batteries
- Lecture 12 - Operational mechanisms for lithium batteries: Intercalation materials, alloys
- Lecture 13 - Differences of voltage profiles between intercalation materials, alloys, and conversion
- Lecture 14 - Properties of electrode materials (Case study: alloy as anode)
- Lecture 15 - Properties of electrode materials (conversion type oxide as case study)
- Lecture 16 - Positive electrodes: Lithiated transition metal oxides, lithiated iron oxyphosphates etc
- Lecture 17 - Negative electrodes: Carbonaceous materials, lithium titanium oxides etc
- Lecture 18 - Electrolyte :Liquid Electrolyte, Polymer Electrolyte
- Lecture 19 - Current Collector, Conductive Agents, Separator and Other Accessories
- Lecture 20 - Novel materials for lithium ion rechargeable cells
- Lecture 21 - Principle of Operation of Commercial Cells : viz. C - NMC, C - NCA etc
- Lecture 22 - Principle of operation of commercial cells
- Lecture 23 - Major characteristics of commercial Li ion cells: Cell performance, degradation phenomena
- Lecture 24 - Fabrication of Li ion cell: Cylindrical configuration
- Lecture 25 - Fabrication of Li ion cell: Pouch and prismatic cell
- Lecture 26 - Positive electrodes: Layered oxide, polyanionic compounds (phosphates, sulphates etc)
- Lecture 27 - Negative electrodes: Carbonaceous materials, alloy based and other materials
- Lecture 28 - Electrolytes: Roles and requirements, organic electrolyte, ionic liquid electrolyte
- Lecture 29 - Performance of Na ion rechargeable cell

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

- Lecture 30 - Future perspective of Na ion cells
- Lecture 31 - Introduction to battery module, BMS, thermal management and pack design
- Lecture 32 - Degradation and safety issues of Li ion rechargeable cells
- Lecture 33 - Introduction to battery management system: BMS topologies, hardware, concept of active
- Lecture 34 - Introduction to thermal management: Active thermal management system, passive thermal
- Lecture 35 - Packaging of battery pack and battery testing: Material selection, sealing of enclosure
- Lecture 36 - Classification of supercapacitors: EDLC and pseudocapacitative type
- Lecture 37 - Pseudocapacitor
- Lecture 38 - Asymmetric supercapacitor and BATCAP: Battery supercapacitor hybrid electrochemical
- Lecture 39 - Electrolytes for supercapacitors: Aqueous/organic liquid electrolytes/ionic liquid
- Lecture 40 - Current collectors, separators etc. and their effect on performance
- Lecture 41 - Operational principles of aqueous and Li - O₂ batteries
- Lecture 42 - Electrolytes for Li - O₂ batteries
- Lecture 43 - Limitations of Li - Air batteries
- Lecture 44 - State of the art Li - Air batteries : Carbonaceous materials
- Lecture 45 - State of the art Li - Air batteries: Case study
- Lecture 46 - The element sulfur, principle of operation
- Lecture 47 - Advantages and disadvantages of Li - S batteries, positive electrodes
- Lecture 48 - Electrolyte and negative electrode for Li - S battery
- Lecture 49 - State of the art Li - S batteries : Case study - I
- Lecture 50 - State of the art Li - S batteries : Case study - II
- Lecture 51 - Global Geographic Distribution of Raw Lithium Resources
- Lecture 52 - Nature and geological origin of all potential lithium resources
- Lecture 53 - State of the art extraction techniques and known production reserves
- Lecture 54 - Recycling of lithium and other battery constituents from used battery
- Lecture 55 - Recycling of lithium and other battery constituents from used battery (Continued...)
- Lecture 56 - Lead Acid Batteries: Operational principles, main characteristics and applications
- Lecture 57 - Lead Acid Batteries: Operational principles, main characteristics and applications (Continued...)
- Lecture 58 - Ni-Cd and Ni-MeH Batteries: Operational principles, main characteristics and applications
- Lecture 59 - Redox flow battery vanadium redox battery, operational principle, and main characteristics
- Lecture 60 - Other Redox Flow Battery Technologies

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Texture in Materials

Subject Co-ordinator - Prof. Somjeet Biswas

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction
- Lecture 2 - Texture and Anisotropy
- Lecture 3 - Processing - Texture - Anisotropic Properties
- Lecture 4 - Crystal Structure and Stereographic Projections
- Lecture 5 - Utilization of Stereographic Projections
- Lecture 6 - Diffraction and Bragg's Law
- Lecture 7 - Structure Factor and Diffraction Extinction Criteria
- Lecture 8 - Structure factor and diffraction extinction criteria (Continued...)
- Lecture 9 - Pole figures
- Lecture 10 - Pole figures (Continued...)
- Lecture 11 - Inverse Pole Figures
- Lecture 12 - Three Dimensional Texture Analysis
- Lecture 13 - Euler Angles and ODFs
- Lecture 14 - Euler Angles and ODFs (Continued...)
- Lecture 15 - Euler Angles and ODFs (Continued...)
- Lecture 16 - Euler Angles and ODFs (Continued...)
- Lecture 17 - Symmetry Effects on Orientation Matrix
- Lecture 18 - Euler Space and Orientation Matrices
- Lecture 19 - Texture Fibre, Periodicity in Euler Space, Incomplete Pole Figures
- Lecture 20 - Crystal Structures and Symmetry
- Lecture 21 - Size of Euler Space in Relation to Crystal and Sample Symmetry
- Lecture 22 - Macrotexture and Microtexture Measurements
- Lecture 23 - Penetration Depth of X-ray, Neutron, e-1 and Basics of X-ray Generation
- Lecture 24 - Characteristic X-ray, Absorption and Filters
- Lecture 25 - Principles of pole figure measurements by X-ray diffraction
- Lecture 26 - Texture Goniometer Components
- Lecture 27 - Limitations and Errors in X-ray Texture Measurement and Corrections
- Lecture 28 - Basics of Electron Microscopy - I
- Lecture 29 - Basics of Electron Microscopy - II

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

- Lecture 30 - Kikuchi Diffraction Pattern - I
- Lecture 31 - Kikuchi Diffraction Pattern - II
- Lecture 32 - Quantitative Evaluation of Kikuchi Diffraction Pattern - I
- Lecture 33 - Quantitative evaluation of Kikuchi Diffraction Pattern - II
- Lecture 34 - Quantitative evaluation of Kikuchi Diffraction Pattern - III
- Lecture 35 - Analysis using the TSL-OIM software
- Lecture 36 - Analysis using the AZtec Crystal software
- Lecture 37 - Analysis using the ATEX software
- Lecture 38 - Introduction to solidification texture
- Lecture 39 - Solidification texture in Alloys
- Lecture 40 - Solidification texture in FCC, BCC, and HCP structures
- Lecture 41 - Phase Transformation Texture and Bain Strain
- Lecture 42 - Orientation Relationships between FCC and BCC / BCT
- Lecture 43 - Various Orientation Relationships and Variants
- Lecture 44 - Basic Mechanics of Polycrystal Plasticity
- Lecture 45 - Basic Mechanics of Polycrystal Plasticity (Continued...)
- Lecture 46 - A Metallurgist Point of View
- Lecture 47 - A Metallurgist Point of View (Continued...)
- Lecture 48 - Texture in FCC polycrystals
- Lecture 49 - Texture in BCC polycrystals - I
- Lecture 50 - Texture in BCC polycrystals - II
- Lecture 51 - Texture in HCP polycrystals - I
- Lecture 52 - Texture in HCP polycrystals - II
- Lecture 53 - Texture in HCP polycrystals - III
- Lecture 54 - Static recrystallization
- Lecture 55 - Dynamic recrystallization and recrystallization texture
- Lecture 56 - Dynamic recrystallization and grain refinement during hot large strain shear

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

NPTEL Video Course - Metallurgy and Material Science - Advanced Metallurgical Thermodynamics

Subject Co-ordinator - Prof. B.S. Murty

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Basic definitions
- Lecture 2 - Free energy, Stability, equilibrium in a unary system
- Lecture 3 - Effect of Pressure on equilibrium transformations
- Lecture 4 - Free energy of solutions, free energy-composition diagrams
- Lecture 5 - Solution models, chemical potential
- Lecture 6 - Phase rule, free energy-composition diagrams and phase diagrams
- Lecture 7 - Evolution of phase diagrams
- Lecture 8 - Evolution of phase diagrams, miscibility gap
- Lecture 9 - To concept, partition less solidification
- Lecture 10 - To concept, partition less solidification (Continued...)
- Lecture 11 - Eutectic solidification, glass formation
- Lecture 12 - Kauzmann paradox, order of a transformation, glass forming ability
- Lecture 13 - Eutectic solidification, coupled growth, heterogeneous nucleation
- Lecture 14 - Peritectic solidification, metastable phase diagrams
- Lecture 15 - Errors in drawing phase diagrams, Fe-C vs. Fe-Fe₃C phase diagram
- Lecture 16 - Free energy of undercooled liquid, shape of nucleus
- Lecture 17 - Solid state phase transformations - Precipitation
- Lecture 18 - Precipitation
- Lecture 19 - Precipitation - quasicrystals
- Lecture 20 - Precipitate coarsening, stability of a phase, spinodal decomposition
- Lecture 21 - Spinodal decomposition
- Lecture 22 - Eutectoid reaction
- Lecture 23 - Eutectoid reaction (Continued...)
- Lecture 24 - Bainitic transformation
- Lecture 25 - Kinetics of eutectoid transformations
- Lecture 26 - Martensitic Transformation
- Lecture 27 - Martensitic transformation, order-disorder transformation
- Lecture 28 - Miscibility gap in phase diagrams
- Lecture 29 - Phase diagram calculations

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

Lecture 30 - Thermodynamics of heterogeneous systems

Lecture 31 - Thermodynamics of heterogeneous systems (Continued...)

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

NPTEL Video Course - Metallurgy and Material Science - Materials Characterization

Subject Co-ordinator - Dr. S. Sankaran

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Properties of light, Image formation

Lecture 2 - Magnification and resolution

Lecture 3 - Depth of field, focus and field of view

Lecture 4 - Lens defects, filters and light microscopy introduction

Lecture 5 - Optical microscope demo., Bright field imaging, opaque specimen illumination

Lecture 6 - Opaque stop microscopy, Phase contrast microscopy

Lecture 7 - Dark field microscopy, Polarization microscopy

Lecture 8 - Differential interference contrast and fluorescence microscopy

Lecture 9 - Sample preparation techniques for optical microscopy

Lecture 10A - Tutorial problems (Continuation...)

Lecture 10 - Tutorial problems

Lecture 11 - Introduction to scanning electron Microscopy

Lecture 12 - Lens aberrations, Object resolution, Image quality

Lecture 13 - Interaction between electrons and sample, Imaging capabilities, Structural analysis, Elemental analysis

Lecture 14 - SEM and its mode of operation, Effect of aperture size, Working distance, condenser lens strength

Lecture 15 - SEM and its mode of operation- continuation, Relation between probe current and probe diameter,

Lecture 16 - Factors affecting Interaction volume, Demonstration of SEM

Lecture 17 - Image formation and interpretation

Lecture 18 - Image formation and interpretation continued, EDS, WDS

Lecture 19 - Special contrast mechanisms, Monte Carlo simulations of Interaction volume

Lecture 20 - Electron channeling contrast imaging (ECCI), Electron back scattered diffraction (EBSD)-Theory &

Lecture 21 - Tutorial Problems on SEM

Lecture 22 - Basics of X-ray emission from source, electron excitation and X-ray interaction with materials

Lecture 23 - Properties of X-rays

Lecture 24 - Bragg's Law Derivation

Lecture 25 - Diffraction relationship with reciprocal space

Lecture 26 - X-ray scattering

Lecture 27 - Factors affecting intensities of X-ray peaks

Lecture 28 - Factors affecting intensities of X-ray peaks- continuation

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

- Lecture 29 - Effect of crystallite size and strain on intensity of X-rays
- Lecture 30 - Profile fit, Factors affecting peak broadening
- Lecture 31 - Indexing of diffraction pattern, Quantitative analysis
- Lecture 32 - Indexing, Quantitative analysis-continuation, Residual stress measurements
- Lecture 33 - XRD and Residual stress measurement- lab demonstration
- Lecture 34 - Introduction to Transmission Electron Microscopy (TEM)
- Lecture 35 - Fundamentals of Transmission Electron Microscopy (TEM)
- Lecture 36 - Basics of Diffraction-1
- Lecture 37 - Basics of Diffraction-2
- Lecture 38 - TEM imaging-1
- Lecture 39 - TEM imaging-2
- Lecture 40 - TEM instrument demonstration
- Lecture 41 - TEM sample preparation-1
- Lecture 42 - TEM sample preparation-2
- Lecture 43 - XRD Tutorial - 1
- Lecture 44 - XRD tutorial - 2
- Lecture 45 - TEM Tutorial - 1
- Lecture 46 - TEM Tutorial - 2
- Lecture 47 - Quantitative metallography - Tutorial 1
- Lecture 48 - Quantitative metallography - Tutorial 2
- Lecture 49 - Quantitative metallography - Tutorial 3
- Lecture 50 - Quantitative metallography - Tutorial 4
- Lecture 51 - Quantitative metallography - Tutorial 5
- Lecture 52 - Quantitative metallography - Tutorial 6
- Lecture 53 - Quantitative metallography - Tutorial 7

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

NPTEL Video Course - Metallurgy and Material Science - Physics of Materials

Subject Co-ordinator - Dr. Prathap Haridoss

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction
- Lecture 2 - Properties of Materials
- Lecture 3 - Thermal Expansion
- Lecture 4 - Measuring Electrical Conductivity
- Lecture 5 - Free Electron Gas
- Lecture 6 - The Ideal Gas
- Lecture 7 - Drude Model
- Lecture 8 - Drude Model
- Lecture 9 - Drude Model
- Lecture 10 - Drude Model
- Lecture 11 - Large Systems and Statistical Mechanics
- Lecture 12 - Maxwell Boltzmann Statistics
- Lecture 13 - Classical Particles and Quantum Particles
- Lecture 14 - History of Quantum Mechanics - 1
- Lecture 15 - History of Quantum Mechanics - 2
- Lecture 16 - Introduction to Drude Sommerfeld model
- Lecture 17 - Fermi-Dirac Statistics - Part 1
- Lecture 18 - Fermi-Dirac Statistics - Part 2
- Lecture 19 - Features of the Fermi Dirac Distribution Function
- Lecture 20 - Maxwell-Boltzmann Distribution Vs Fermi-Dirac Distribution
- Lecture 21 - Anisotropy and Periodic Potential in a Solid
- Lecture 22 - Confinement and Quantization - Part 1
- Lecture 23 - Confinement and Quantization - Part 2
- Lecture 24 - Density of States
- Lecture 25 - Fermi Energy, Fermi Surface, Fermi Temperature
- Lecture 26 - Electronic Contribution to Specific Heat at Constant Volume
- Lecture 27 - Reciprocal Space-1
- Lecture 28 - Reciprocal Space-2
- Lecture 29 - Reciprocal Space-3

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

- Lecture 30 - Wigner Seitz Cell and Introduction to Brillouin Zones
- Lecture 31 - Brillouin Zones, Diffraction, and Allowed Energy Levels
- Lecture 32 - E Vs k, Brillouin Zones and the Origin of Bands
- Lecture 33 - Calculating Allowed Energy Bands and Forbidden Band Gaps
- Lecture 34 - Bands; Free Electron Approximation, Tight Binding Approximation
- Lecture 35 - Semiconductors
- Lecture 36 - Magnetic Properties
- Lecture 37 - Electron Compounds; Phonons, Optoelectronic Materials
- Lecture 38 - Superconductivity
- Lecture 39 - Bose-Einstein Statistics
- Lecture 40 - Physics of Nano Scale Materials; Course Summary

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

NPTEL Video Course - Metallurgy and Material Science - Electronic materials, devices, and fabrication

Subject Co-ordinator - Prof. Parasuraman S

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Metals, semiconductors and insulators
Lecture 2 - Introduction to semiconductors
Lecture 3 - Density of states and Fermi-Dirac statistics
Lecture 4 - Assignment 1 - Bonding, DOS, and Fermi statistics
Lecture 5 - Intrinsic semiconductors
Lecture 6 - Intrinsic semiconductors - conductivity
Lecture 7 - Assignment 2 - Intrinsic semiconductors
Lecture 8 - Extrinsic semiconductors
Lecture 9 - Extrinsic semiconductors - Fermi level
Lecture 10 - Extrinsic semiconductors - conductivity
Lecture 11 - Assignment 3 - Extrinsic semiconductors
Lecture 12 - Metal-semiconductor junctions
Lecture 13 - Assignment 4 - Metal-semiconductor junctions
Lecture 14 - pn junctions in equilibrium
Lecture 15 - pn junctions under bias
Lecture 16 - pn junction breakdown and heterojunctions
Lecture 17 - Assignment 5 - pn junctions
Lecture 18 - Transistors
Lecture 19 - MOSFETs
Lecture 20 - Assignment 6 - transistors
Lecture 21 - Optoelectronic devices
Lecture 22 - Optoelectronic devices
Lecture 23 - Optoelectronic devices
Lecture 24 - Optoelectronic devices
Lecture 25 - Optoelectronic devices
Lecture 26 - Assignment 7 - optical properties
Lecture 27 - Assignment 8 - optoelectronic devices
Lecture 28 - Semiconductor manufacturing
Lecture 29 - Si wafer manufacturing

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

- Lecture 30 - IC device manufacturing
- Lecture 31 - Layering
- Lecture 32 - Doping
- Lecture 33 - Lithography
- Lecture 34 - Etching and deposition (growth)
- Lecture 35 - Metallization and polishing
- Lecture 36 - Process and device evaluation
- Lecture 37 - Productivity and process yield
- Lecture 38 - Clean room design and contamination control
- Lecture 39 - Devices and IC formation
- Lecture 40 - IC circuit logic and packaging

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Fundamentals of optical and scanning electron micro

Subject Co-ordinator - Dr. S. Sankaran

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Properties of light, Image formation

Lecture 2 - Magnification and resolution

Lecture 3 - Depth of field, focus and field of view

Lecture 4 - Lens defects, filters and light microscopy introduction

Lecture 5 - Optical microscope demo., Bright field imaging, opaque specimen illumination

Lecture 6 - Opaque stop microscopy, Phase contrast microscopy

Lecture 7 - Dark field microscopy, Polarization microscopy

Lecture 8 - Differential interference contrast and fluorescence microscopy

Lecture 9 - Sample preparation techniques for optical microscopy

Lecture 10 - Tutorial problems

Lecture 11 - Tutorial problems (Continued...)

Lecture 12 - Introduction to scanning electron Microscopy

Lecture 13 - Lens aberrations, Object resolution, Image quality

Lecture 14 - Interaction between electrons and sample, Imaging capabilities, Structural analysis, Elemental a

Lecture 15 - SEM and its mode of operation, Effect of aperture size, Working distance, condenser lens strength

Lecture 16 - SEM and its mode of operation- continuation, Relation between probe current and probe diameter,

Lecture 17 - Factors affecting Interaction volume, Demonstration of SEM

Lecture 18 - Image formation and interpretation

Lecture 19 - Image formation and interpretation continued, EDS, WDS

Lecture 20 - Special contrast mechanisms, Monte Carlo simulations of Interaction volume

Lecture 21 - Electron channeling contrast imaging (ECCI), Electron back scattered diffraction (EBSD)-Theory &

Lecture 22 - Tutorial Problems on SEM

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NPTEL Video Course - Metallurgy and Material Science - NOC:Fundamentals of electronic materials and devices

Subject Co-ordinator - Prof. Parasuraman S

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Electronic Materials
- Lecture 2 - Semiconductors - Introduction
- Lecture 3 - Electron statistics in a solid
- Lecture 4 - Worked numericals on week 1 lessons
- Lecture 5 - Intrinsic semiconductors
- Lecture 6 - Intrinsic semiconductors - conductivity
- Lecture 7 - Optional - worked assignment on intrinsic semiconductors
- Lecture 8 - Extrinsic semiconductors - Introduction
- Lecture 9 - Extrinsic semiconductors - Fermi level
- Lecture 10 - Extrinsic semiconductors - Mobility
- Lecture 11 - Worked assignment on extrinsic semiconductors
- Lecture 12 - Metal-semiconductor junctions
- Lecture 13 - pn junctions in equilibrium
- Lecture 14 - Optional - worked assignment on metal-semiconductor junctions
- Lecture 15 - pn junctions under bias
- Lecture 16 - Junction breakdown and heterojunctions
- Lecture 17 - Worked assignment on pn junctions
- Lecture 18 - Transistors - overview
- Lecture 19 - MOSFETs
- Lecture 20 - Worked assignment on transistors
- Lecture 21 - Optoelectronic devices - Introduction
- Lecture 22 - Light emitting diodes
- Lecture 23 - Solid state semiconductor lasers
- Lecture 24 - Optional - worked assignment on optical properties
- Lecture 25 - Photodetectors
- Lecture 26 - Solar cells
- Lecture 27 - Worked assignment on optoelectronic devices

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Introduction to Reciprocal Space and its use in Sc

Subject Co-ordinator - Dr. Prathap Haridoss

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Reciprocal space; Definition and Properties

Lecture 2 - Condition for Diffraction

Lecture 3 - Worked out examples

Lecture 4 - Ewald Sphere and lattices in reciprocal space

Lecture 5 - Wigner Sietz cells and Brillouin Zones

Lecture 6 - Worked out exmaples

Lecture 7 - Brillouin Zones, Diffraction and allowed energy levels

Lecture 8 - E Vs K, Brillouin zones and the Origin of Bands

Lecture 9 - Week 3 Worked out examples

Lecture 10 - Reciprocal space as Fourier transform of real lattice

Lecture 11 - Alternate notation of reciprocal space

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Analysis and Modeling of Welding

Subject Co-ordinator - Dr. G. Phanikumar

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to fusion welding processes

Lecture 2 - Introduction to fusion welding processes

Lecture 3 - Heat sources - Part 1/2

Lecture 4 - Heat sources - Part 2/2

Lecture 5 - Heat removal

Lecture 6 - Thermal Modelling - Part 1/2

Lecture 7 - Thermal Modelling - Part 2/2

Lecture 8 - Zones in a weldment

Lecture 9 - Analytical Solutions to Weld Thermal Field

Lecture 10 - Conduction to Keyhole mode

Lecture 11 - Fluid flow modelling - Part 1/2

Lecture 12 - Fluid flow modelling - Part 2/2

Lecture 13 - Solute transfer modelling - Part 1/2

Lecture 14 - Solute transfer modelling - Part 2/2

Lecture 15 - Solute segregation profile - Part 1/2

Lecture 16 - Solute segregation profile - Part 2/2

Lecture 17 - Microstructure Formation in Fusion Welds

Lecture 18 - Numerical Solutions to Thermal Field and Fluid Flow in Welding - Part 1

Lecture 19 - Numerical Solutions to Thermal Field and Fluid Flow in Welding - Part 2

Lecture 20 - Dissimilar Welding

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Fundamentals of X-ray Diffraction and Transmission

Subject Co-ordinator - Dr. S. Sankaran

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Basics of X-ray emission from source, electron excitation and X-ray interaction with materials in
- Lecture 2 - Properties of X-rays
- Lecture 3 - Bragg's law derivation
- Lecture 4 - Diffraction relationship with reciprocal space
- Lecture 5 - X-ray scattering
- Lecture 6 - Factors affecting intensities of X-ray peaks
- Lecture 7 - Factors affecting intensities of X-ray peaks (Continued...)
- Lecture 8 - Effect of crystallite size and strain on intensity of X-rays
- Lecture 9 - Profile fit, Factors affecting peak brodening
- Lecture 10 - Indexing of diffraction pattern, Quantitative analysis
- Lecture 11 - Indexing and Quantitative analysis-continuation, Residual stress measurements
- Lecture 12 - XRD and Residual stress measurement - lab demonstration
- Lecture 13 - XRD Tutorial - 1
- Lecture 14 - XRD tutorial - 2
- Lecture 15 - Introduction to Transmission Electron Microscopy (TEM)
- Lecture 16 - Fundamentals of Transmission Electron Microscopy (TEM)
- Lecture 17 - Fundamentals of X-ray diffraction and Transmission electron microscopy
- Lecture 18 - Basics of Diffraction - 2
- Lecture 19 - TEM Imaging - 1
- Lecture 20 - TEM Imaging - 2
- Lecture 21 - TEM instrument demonstration
- Lecture 22 - TEM sample preparation - 1
- Lecture 23 - TEM sample preparation - 2
- Lecture 24 - TEM Tutorial - 1
- Lecture 25 - TEM Tutorial - 2
- Lecture 26 - TEM Tutorial - 3
- Lecture 27 - TEM Tutorial - 4

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Theory and Practice of Non Destructive Testing

Subject Co-ordinator - Dr. Ranjit Bauri

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Visual optical method
Lecture 2 - Dye Penetrant Testing - 1
Lecture 3 - Dye Penetrant Testing - 2
Lecture 4 - Dye Penetrant Testing - 3
Lecture 5 - Dye Penetrant Testing - 4
Lecture 6 - Magnetic particle testing - 1
Lecture 7 - Magnetic particle testing - 2
Lecture 8 - Magnetic particle testing - 3
Lecture 9 - Magnetic particle testing - 4
Lecture 10 - Magnetic particle testing - 5
Lecture 11 - Eddy current testing - 1
Lecture 12 - Eddy current testing - 2
Lecture 13 - Eddy current testing - 3
Lecture 14 - Eddy current testing - 4
Lecture 15 - Eddy current testing - 5
Lecture 16 - Ultrasonic testing - 1
Lecture 17 - Ultrasonic testing - 2
Lecture 18 - Ultrasonic testing - 3
Lecture 19 - Ultrasonic testing - 4
Lecture 20 - Ultrasonic testing - 5
Lecture 21 - Ultrasonic testing - 6
Lecture 22 - Ultrasonic testing - 7
Lecture 23 - Ultrasonic testing - 8
Lecture 24 - Ultrasonic testing - 9
Lecture 25 - Ultrasonic testing - 10
Lecture 26 - Acoustic Emission Testing - 1
Lecture 27 - Acoustic Emission Testing - 2
Lecture 28 - Acoustic Emission Testing - 3
Lecture 29 - Acoustic Emission Testing - 4

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- Lecture 30 - Acoustic Emission Testing - 5
- Lecture 31 - Radiography - 1
- Lecture 32 - Radiography - 2
- Lecture 33 - Radiography - 3
- Lecture 34 - Radiography - 4
- Lecture 35 - Radiography - 5
- Lecture 36 - Radiography - 6
- Lecture 37 - Radiography - 7
- Lecture 38 - Radiography - 8
- Lecture 39 - Radiography - 9
- Lecture 40 - Radiography - 10

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Defects in Materials

Subject Co-ordinator - Prof. Sundararaman M

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to defects in materials
Lecture 2 - 1-D Lattice
Lecture 3 - 2-D Lattice
Lecture 4 - 3-D Lattice - a
Lecture 5 - 3-D Lattice - b
Lecture 6 - 3-D Lattice - c
Lecture 7 - 3-D Crystals
Lecture 8 - Types of Point Defects
Lecture 9 - Vacancy Concentration Determination - 1
Lecture 10 - Vacancy Concentration Determination - 2
Lecture 11 - Point Defect Interstitial
Lecture 12 - Transformation of co-ordinates
Lecture 13 - Tensor - 1
Lecture 14 - Tensor - 2
Lecture 15 - Strain
Lecture 16 - Stress
Lecture 17 - Description of Dislocation - 1
Lecture 18 - Description of Dislocation - 2
Lecture 19 - Stress field around Dislocation
Lecture 20 - Self Energy of Dislocation
Lecture 21 - Force on Dislocation
Lecture 22 - Forces Between Dislocation
Lecture 23 - Chemical Force on Dislocation
Lecture 24 - Perfect Dislocation in FCC Structures
Lecture 25 - Intrinsic Stacking Faults in FCC
Lecture 26 - Extrinsic Faults and Thompson Tetrahedron in FCC
Lecture 27 - Dislocations in BCC and HCP
Lecture 28 - Dislocations in Ordered Alloys and Dislocation Dislocation Interaction
Lecture 29 - Twinning - 1

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- Lecture 30 - Twinning - 2
- Lecture 31 - Martensitic Transformation - 1
- Lecture 32 - Martensitic Transformation - 2
- Lecture 33 - Interfaces - 1
- Lecture 34 - Interfaces - 2
- Lecture 35 - Defect Interaction and Strength

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Elementary Stereology for Quantitative Metallography

Subject Co-ordinator - Dr. S. Sankaran

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Method of Stereology

Lecture 2 - Volume Fraction and Particle Size - Part 1

Lecture 3 - Volume Fraction and Particle Size - Part 2

Lecture 4 - Geometric Probability - Part 1

Lecture 5 - Geometric Probability - Part 2

Lecture 6 - Probability Distributions

Lecture 7 - Volume Fraction and Particle Size - Part 3

Lecture 8 - Volume Fraction and Particle Size - Part 4

Lecture 9 - Geometrical Probability - I

Lecture 10 - Geometrical Probability - II

Lecture 11 - Basic Stereological Parameters - Part 1

Lecture 12 - Basic Stereological Parameters - Part 2

Lecture 13 - Counting of grains and particles - Part 1

Lecture 14 - Description of Polycrystalline Microstructures derived measures

Lecture 15 - Counting of grains and particles - Part 2

Lecture 16 - Counting of Grains and Particles - Part 3

Lecture 17 - Counting of Grains and Particles - Part 4

Lecture 18 - Other Applications of the Disector

Lecture 19 - Stereology of Anisotropic Microstructures

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Welding of Advanced High Strength Steels for Autom

Subject Co-ordinator - Prof. Murugaiyan Amirthalingam

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to the course, Introduction to physical metallurgy of steels
- Lecture 2 - Martensitic transformation, Introduction to modern automotive steels
- Lecture 3 - Introduction to modern automotive steels
- Lecture 4 - Introduction to advanced high strength steels
- Lecture 5 - Introduction to Dual Phase Steel and TRIP Steel Heat Treatments
- Lecture 6 - Thermal and Mechanical Processing of TRIP and Hot Forming Steels
- Lecture 7 - Introduction to Welding Processes in Automotive Industries
- Lecture 8 - Principles of Resistance Spot Welding (RSW)
- Lecture 9 - Process Characteristics of Resistance Spot Welding - Part I
- Lecture 10 - Process Characteristics of Resistance Spot Welding - Part II
- Lecture 11 - Introduction to Laser Beam Welding - Part I
- Lecture 12 - Introduction to Laser Beam Welding - Part II
- Lecture 13 - Principles of Gas Metal Arc Welding - Part I
- Lecture 14 - Principles of Gas Metal Arc Welding - Part II
- Lecture 15 - Welding Metallurgy of Advanced High Strength Steels - Part I
- Lecture 16 - Microstructural Evolution During Welding of Advanced High Strength Steels
- Lecture 17 - Elemental Behaviour During Welding of Advanced High Strength Steels
- Lecture 18 - Quantification of Microstructural Constituents in Automotive Steel Welds - Part I
- Lecture 19 - Quantification of Microstructural Constituents in Automotive Steel Welds - Part II and Mechanical
- Lecture 20 - Methodologies to Improve the Weldability of Advanced High Strength Steels

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NPTEL Video Course - Metallurgy and Material Science - NOC:Welding Processes

Subject Co-ordinator - Prof. Murugaiyan Amirthalingam

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to the course
- Lecture 2 - Classification of welding processes and definition of welding arc
- Lecture 3 - Physics of welding arc - Part 1
- Lecture 4 - Physics of welding arc - Part 2
- Lecture 5 - Physics of welding arc - Part 3
- Lecture 6 - Physics of welding arc - Part 4
- Lecture 7 - Fundamentals of ionisation in welding arc
- Lecture 8 - Electrical conductivity of welding arc
- Lecture 9 - Electrical resistivity of welding arc
- Lecture 10 - Heat transfer inside the arc
- Lecture 11 - Arc ignition mechanisms Part - I
- Lecture 12 - Arc ignition mechanisms Part - II
- Lecture 13 - Principles of Gas Tungsten Arc Welding
- Lecture 14 - Shielding gases for arc welding
- Lecture 15 - Selection of shielding gases for engineering alloys
- Lecture 16 - Arc welding power sources - Part 1
- Lecture 17 - Arc welding power sources - Part 2
- Lecture 18 - Arc welding power sources - Part 3
- Lecture 19 - Variations in GTAW process
- Lecture 20 - Square wave, variable polarity, GTAW with filler, hot wire GTAW
- Lecture 21 - Dual gas GTAW and Plasma Welding processes
- Lecture 22 - Multi cathode GTAW and Activated GTAW
- Lecture 23 - Buried GTAW and Rate controlling parameters of GTAW
- Lecture 24 - Introduction to consumable welding processes
- Lecture 25 - Melting rate of consumable wires
- Lecture 26 - Physics of droplet transfer in consumable welding
- Lecture 27 - Modes of droplet transfer - Part 1
- Lecture 28 - Modes of droplet transfer - Part 2
- Lecture 29 - Modes of droplet transfer - Part 3

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- Lecture 30 - Shielded Metal Arc Welding
- Lecture 31 - Flux cored arc welding - Introduction
- Lecture 32 - Electrode fluxes and process characteristics of flux cored arc welding
- Lecture 33 - Flux cored arc welding - Process characteristics
- Lecture 34 - Advances in gas metal arc welding - Pulsed GMAW
- Lecture 35 - Advances in gas metal arc welding - Controlled dip short circuiting processes
- Lecture 36 - Submerged arc welding
- Lecture 37 - Resistance welding - Fundamentals
- Lecture 38 - Resistance spot welding - Part 1
- Lecture 39 - Resistance spot welding - Part 2
- Lecture 40 - Resistance spot welding - Part 3
- Lecture 41 - Resistance spot welding - Part 4
- Lecture 42 - Variants in resistance welding - Part 1
- Lecture 43 - Variants in resistance welding - Part 2
- Lecture 44 - Laser welding process - Introduction - Part 1
- Lecture 45 - Laser welding process - Part 2
- Lecture 46 - Laser welding process - Part 3
- Lecture 47 - Laser welding process - Part 4
- Lecture 48 - Electron beam welding process
- Lecture 49 - Other welding processes - Electroslag welding
- Lecture 50 - Magnetically Impelled Arc Butt (MIAB) welding
- Lecture 51 - Aluminothermic (thermit) welding
- Lecture 52 - Introduction to solid state welding processes - Friction welding
- Lecture 53 - Friction stir welding - Part 1
- Lecture 54 - Friction stir welding - Part 2
- Lecture 55 - Other solid state welding processes
- Lecture 56 - Joining processes for Plastics - Part 1
- Lecture 57 - Joining processes for Plastics - Part 2
- Lecture 58 - Adhesive bonding of plastics
- Lecture 59 - Welding nomenclatures

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Creep Deformation of Materials

Subject Co-ordinator - Prof. Srikant Gollapudi

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Importance of studying creep
- Lecture 2 - Basics of plastic deformation and characteristics of dislocations - Part 1
- Lecture 3 - Basics of plastic deformation and characteristics of dislocations - Part 2
- Lecture 4 - Basics of plastic deformation and characteristics of dislocations - Part 3
- Lecture 5 - Creep and different factors that influence creep deformation - Part 1
- Lecture 6 - Creep and different factors that influence creep deformation - Part 2
- Lecture 7 - Creep and different factors that influence creep deformation - Part 3
- Lecture 8 - Creep and different factors that influence creep deformation - Part 4
- Lecture 9 - Creep and different factors that influence creep deformation - Part 5
- Lecture 10 - Creep and different factors that influence creep deformation - Part 6
- Lecture 11 - Mechanisms of Creep - Part 1
- Lecture 12 - Mechanisms of Creep - Part 2
- Lecture 13 - Mechanisms of Creep - Part 3
- Lecture 14 - Mechanisms of Creep - Part 4
- Lecture 15 - Mechanisms of Creep - Part 5
- Lecture 16 - Transitions in Creep Mechanisms and Creep Constitutive Equation
- Lecture 17 - Deformation Mechanism Maps - Part 1
- Lecture 18 - Deformation Mechanism Maps - Part 2
- Lecture 19 - Modeling the Useful Creep Life of Materials/Components - Part 1
- Lecture 20 - Modeling the Useful Creep Life of Materials/Components - Part 2
- Lecture 21 - Modeling the Useful Creep Life of Materials/Components - Part 3
- Lecture 22 - Creep Testing Methods - Part 1
- Lecture 23 - Creep Testing Methods - Part 2
- Lecture 24 - Improving Creep Resistance of Materials

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NPTEL Video Course - Metallurgy and Material Science - NOC:Nanotechnology, Science and Applications

Subject Co-ordinator - Dr. Prathap Haridoss

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Nanotechnology Science and Applications - Introduction
- Lecture 2 - Nanotechnology
- Lecture 3 - Discussion on Feynmanâ s talk on Nanotechnology - Part I
- Lecture 4 - Discussion on Feynmanâ s talk on Nanotechnology - Part II
- Lecture 5 - Impact of the nanoscale on thermodynamic considerations
- Lecture 6 - Phase Diagrams and Stable Phases
- Lecture 7 - Calorimetry
- Lecture 8 - Zirconia - ZrO₂
- Lecture 9 - Experimentally Investigating the Hall-Petch relationship
- Lecture 10 - Impact of the Nanoscale on the Hall-Petch Relationship
- Lecture 11 - Impact of the nanoscale on Mechanical properties
- Lecture 12 - Superplasticity and the Nanoscale
- Lecture 13 - Superplasticity and the Nanoscale
- Lecture 14 - Severe Plastic Deformation and the nanoscale
- Lecture 15 - An approach to prepare bulk nanostructures
- Lecture 16 - Nanosized Ferroelectrics
- Lecture 17 - Impact of the nanoscale on optical properties
- Lecture 18 - Experimental approach to study impact of the nanoscale on optical properties
- Lecture 19 - Impact of the nanoscale on optical properties
- Lecture 20 - Nanocomposites
- Lecture 21 - Effect of Nanoscale on Magnetic Properties
- Lecture 22 - Effect of Nanostructure on Damping Properties
- Lecture 23 - Carbon
- Lecture 24 - Carbon Nanotubes
- Lecture 25 - Graphene, a 2D nanomaterials

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NPTEL Video Course - Metallurgy and Material Science - NOC: Powder Metallurgy

Subject Co-ordinator - Dr. Ranjit Bauri

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to Powder Metallurgy
- Lecture 2 - Powder Fabrication Methods
- Lecture 3 - Powder Fabrication Methods
- Lecture 4 - Powder Fabrication Methods
- Lecture 5 - Powder Fabrication Methods
- Lecture 6 - Gas atomization
- Lecture 7 - Water Atomization
- Lecture 8 - Centrifugal Atomization
- Lecture 9 - Comparison of Atomization techniques
- Lecture 10 - Nucleation and Growth
- Lecture 11 - Thermodynamics and Kinetic of Solidification
- Lecture 12 - Microstructure Control
- Lecture 13 - Microstructure control
- Lecture 14 - Dendritic growth in pure metals
- Lecture 15 - Dendritic growth in alloys
- Lecture 16 - Crystalline and Amorphous structures
- Lecture 17 - Crystalline vs Amorphous
- Lecture 18 - T-T-T diagram
- Lecture 19 - Effect of particle size on microstructure
- Lecture 20 - Powder Characterization
- Lecture 21 - Basis for particle size measurement
- Lecture 22 - Measurement of particle size and size distribution
- Lecture 23 - Particle size distribution
- Lecture 24 - Dynamic Light Scattering - 1
- Lecture 25 - Dynamic Light Scattering - 2
- Lecture 26 - Particle size measurement - Other methods
- Lecture 27 - Surface Area Analysis - 1
- Lecture 28 - Surface Area Analysis - 2
- Lecture 29 - BET Surface Area Analysis

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- Lecture 30 - Interparticle friction
- Lecture 31 - Powder packing
- Lecture 32 - Powder mixing and blending
- Lecture 33 - Powder Lubrication and Coating
- Lecture 34 - Powder compaction - 1
- Lecture 35 - Powder compaction - 2
- Lecture 36 - Powder compaction - 3
- Lecture 37 - Cold Isostatic Pressing and; Powder Injection Molding
- Lecture 38 - Powder Injection Molding - 2
- Lecture 39 - Slurry Techniques
- Lecture 40 - Tape casting
- Lecture 41 - Sintering - 1
- Lecture 42 - Sintering - 2
- Lecture 43 - Sintering - 3
- Lecture 44 - Sintering - 4
- Lecture 45 - Sintering - 5
- Lecture 46 - Sintering - 6
- Lecture 47 - Sintering - 7
- Lecture 48 - Sintering - 8
- Lecture 49 - Sintering - 9
- Lecture 50 - Sintering - 10
- Lecture 51 - Liquid Phase Sintering - 1
- Lecture 52 - Liquid Phase Sintering - 2
- Lecture 53 - Liquid Phase Sintering - 3
- Lecture 54 - Liquid Phase Sintering - 4
- Lecture 55 - Liquid Phase Sintering - 5
- Lecture 56 - Full Density Processing - 1
- Lecture 57 - Full Density Processing - 2
- Lecture 58 - Full Density Processing - 3
- Lecture 59 - Full Density Processing - 4
- Lecture 60 - Spark Plasma Sintering (SPS)

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NPTEL Video Course - Metallurgy and Material Science - NOC:Carbon Materials and Manufacturing

Subject Co-ordinator - Prof. Swati Sharma

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to Materials and Manufacturing
- Lecture 2 - Mathematical Representation of Material Properties
- Lecture 3 - Story of Carbon: Carbon on Earth and in Outer Space
- Lecture 4 - Story of Carbon: Carbon in Technology
- Lecture 5 - Isotopes of carbon
- Lecture 6 - Hybridization in Carbon Atoms
- Lecture 7 - sp^3 , sp^2 and sp Hybridization: Diamond, Graphite and Carbyne
- Lecture 8 - $sp^{(2+n)}$ Hybridization: Curved Carbon
- Lecture 9 - Allotropes of Carbon and Their Classification
- Lecture 10 - Carbon Allotrope Conversion
- Lecture 11 - Phase Diagram of Carbon
- Lecture 12 - Introduction to Engineering Carbons
- Lecture 13 - Graphite Crystal Structure
- Lecture 14 - Rhombohedral Graphite and Stacking Faults
- Lecture 15 - Graphite Ore Processing
- Lecture 16 - Synthetic Graphite Production from Needle Coke
- Lecture 17 - Kish Graphite and PVC-Derived Graphite
- Lecture 18 - Highly Oriented Pyrolytic Graphite
- Lecture 19 - Pyrolysis of Gaseous Hydrocarbons
- Lecture 20 - Polymer-derived Carbon: Coking and Charring Mechanism
- Lecture 21 - Kinetics of Graphitization
- Lecture 22 - Microstructure of Non-Graphitizing Carbon
- Lecture 23 - Glass-Like Carbon: Introduction and Properties
- Lecture 24 - Glass-Like Carbon: Industrial Manufacturing
- Lecture 25 - Microfabrication with Glass-Like Carbon
- Lecture 26 - Carbon Materials and Manufacturing
- Lecture 27 - X-Ray and Nano-Imprint Lithography
- Lecture 28 - Activated Carbon: Introduction and Properties
- Lecture 29 - Activated Carbon: Industrial Manufacturing

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- Lecture 30 - Carbon Black: Introduction and Properties
- Lecture 31 - Carbon Black: Industrial Manufacturing
- Lecture 32 - Carbon Fiber: Introduction and Properties
- Lecture 33 - Melt Spinning of Petroleum Pitches
- Lecture 34 - Electrospinning and Viscoelasticity
- Lecture 35 - Carbonization of Polyacrylonitrile (PAN) Fibers
- Lecture 36 - Mechanical Property Testing Methods for Carbon Fibers
- Lecture 37 - Defects in Carbon Fibers
- Lecture 38 - Introduction to Carbon Fiber Reinforced Plastic (CFRP)
- Lecture 39 - Machining of Carbon Fiber Reinforced Plastic
- Lecture 40 - Carbon/Carbon Composite
- Lecture 41 - Carbon/Metal and Carbon/Concrete Composites: Manufacture and Properties
- Lecture 42 - Graphene: Introduction and Crystal Structure
- Lecture 43 - Graphene: History and Nomenclature
- Lecture 44 - Chemical Vapor Deposition of Graphene - I
- Lecture 45 - Chemical Vapor Deposition of Graphene - II
- Lecture 46 - Defects in Graphene and the (n,m) Notations
- Lecture 47 - Carbon Nanotube: Introduction and Properties
- Lecture 48 - Vapor Phase Growth of Carbon Nanotube
- Lecture 49 - Vapor Deposited Diamond
- Lecture 50 - Diamond Like Carbon
- Lecture 51 - X-Ray Diffraction Analysis of Carbon Materials
- Lecture 52 - Raman Spectroscopy of Carbon Materials
- Lecture 53 - Transmission Electron Microscopy of Carbon Materials
- Lecture 54 - Surface Area Analysis of Carbon Materials
- Lecture 55 - Numerical Problems: Carbon Manufacturing and Characterization
- Lecture 56 - Large Scale Industrial Applications of Carbon Materials
- Lecture 57 - Micro and Nano Scale Applications of Carbon Materials: Rigid and flexible carbon devices
- Lecture 58 - Supply Chain of Industrial Carbons
- Lecture 59 - Summary of NPTTEL Course on Carbon Materials and Manufacturing

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Mechanical Behavior of Materials

Subject Co-ordinator - Prof. S. Sankaran

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction
- Lecture 2 - Chemical Bonding in Materials
- Lecture 3 - Strength of materials - a short overview - Part I
- Lecture 4 - Strength of materials - a short overview - Part II
- Lecture 5 - Strength of materials - a short overview - Part III
- Lecture 6 - Strength of materials - a short overview - Part IV
- Lecture 7 - Strength of materials - a short overview - Part V
- Lecture 8 - Elastic stress- strain relations - Part I
- Lecture 9 - Elastic stress- strain relations - Part II
- Lecture 10 - Elastic properties - Part I
- Lecture 11 - Elastic properties - Part II
- Lecture 12 - Anelasticity
- Lecture 13 - Introduction to Dislocations - I
- Lecture 14 - Introduction to Dislocations - II
- Lecture 15 - Introduction to Dislocations - III
- Lecture 16 - Introduction to Dislocations - IV
- Lecture 17 - Introduction to Dislocations - V
- Lecture 18 - Introduction to Dislocations - VI
- Lecture 19 - Introduction to Dislocations - VII
- Lecture 20 - Introduction to Dislocations - VIII
- Lecture 21 - Introduction to Plastic deformation - I
- Lecture 22 - Introduction to Plastic deformation - II
- Lecture 23 - Introduction to Plastic Deformation - III
- Lecture 24 - Introduction to Plastic Deformation - IV
- Lecture 25 - Introduction to Plastic Deformation - V
- Lecture 26 - Introduction to Plastic Deformation - VI
- Lecture 27 - Strengthening Mechanisms in Crystalline Materials - I
- Lecture 28 - Strengthening Mechanisms in Crystalline Materials - II
- Lecture 29 - Strengthening Mechanisms in Crystalline Materials - III

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- Lecture 30 - Strengthening Mechanisms in Crystalline Materials - IV
- Lecture 31 - Strengthening Mechanisms in Crystalline Materials - V
- Lecture 32 - Mechanical Testing - I
- Lecture 33 - Mechanical Testing - II
- Lecture 34 - Mechanical Testing - III
- Lecture 35 - Mechanical Testing - IV
- Lecture 36 - Mechanical Testing - V
- Lecture 37 - Mechanical Testing - VI
- Lecture 38 - Mechanical Testing - VII
- Lecture 39 - Mechanical Testing - VIII
- Lecture 40 - Mechanical Testing - IX
- Lecture 41 - Mechanical Testing - X
- Lecture 42 - Creep - I
- Lecture 43 - Creep - II
- Lecture 44 - Creep - III
- Lecture 45 - Creep - IV
- Lecture 46 - Creep - V
- Lecture 47 - Creep - VI
- Lecture 48 - Fracture Mechanics - I
- Lecture 49 - Fracture Mechanics - II
- Lecture 50 - Fracture Mechanics - III
- Lecture 51 - Fracture Mechanics - IV
- Lecture 52 - Fracture Mechanics - V
- Lecture 53 - Fracture Mechanics - VI
- Lecture 54 - Fracture Mechanics - VII
- Lecture 55 - Fracture Mechanics - VIII
- Lecture 56 - Fracture Mechanics - IX
- Lecture 57 - Fracture Mechanics - X
- Lecture 58 - Fracture Mechanics - XI
- Lecture 59 - Fatigue - I
- Lecture 60 - Fatigue - II
- Lecture 61 - Fatigue - III
- Lecture 62 - Fatigue - IV
- Lecture 63 - Fatigue - V

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Surface Engineering of Nanomaterials

Subject Co-ordinator - Prof. Kaushik Pal

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Tribology and Its Classification

Lecture 2 - Friction Tribology

Lecture 3 - Wear and Corrosion

Lecture 4 - Lubrication

Lecture 5 - Effect of Tribology on Surface of Nanomaterials

Lecture 6 - Conventional Surface Engineering

Lecture 7 - Types of Surface Modifications

Lecture 8 - Physical Modifications

Lecture 9 - Chemical Modifications

Lecture 10 - Applications of Surface Engineering towards Nanomaterials

Lecture 11 - Deposition and Surface Modification Methods

Lecture 12 - Physical Vapour Deposition (PVD)

Lecture 13 - Chemical Vapour Deposition (CVD)

Lecture 14 - Advanced Surface Modification Practices

Lecture 15 - Advantages of Deposition for Surface Modification

Lecture 16 - Synthesis, Processing and Characterization of Nano-structured Coatings

Lecture 17 - Functional Coatings

Lecture 18 - Advanced Coating Practices

Lecture 19 - Characterization of Nano-coatings

Lecture 20 - Applications of Nano-coatings

Lecture 21 - Need of Advanced Methods for Surface and Coating Testings

Lecture 22 - Size Dependency in Nanostructures of Nanocoatings

Lecture 23 - Size Effect in Electrochemical Properties of Nanostructured Coatings

Lecture 24 - Size Effect in Mechanical Properties of Nanostructured Coatings

Lecture 25 - Size Effect in Physical and Other Properties of Nanostructured Coatings

Lecture 26 - Thin Films for Surface Engineering of Nanomaterials

Lecture 27 - Sputtering Techniques

Lecture 28 - Evaporation Processes

Lecture 29 - Thin Film Deposition through Gas Phase Techniques

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- Lecture 30 - Liquid Phase Techniques
- Lecture 31 - Microencapsulation Processes
- Lecture 32 - Microencapsulation
- Lecture 33 - Plating of Nanocomposite Coatings - I
- Lecture 34 - Plating of Nanocomposite Coatings - II
- Lecture 35 - Advantages of Microencapsulation over Other Conventional Methods
- Lecture 36 - Current Trends in Surface Modification of Nanomaterials - Part-1
- Lecture 37 - Current Trends in Surface Modification of Nanomaterials - Part-2
- Lecture 38 - Current Trends in Surface Modification of Nanomaterials - Part-3
- Lecture 39 - Modified Nanomaterials
- Lecture 40 - Main Problems in Synthesis of Modified Nanomaterials

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Material Science and Engineering

Subject Co-ordinator - Dr. Vivek Pancholi

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Introduction
Lecture 2 - Atomic structure and bonding
Lecture 3 - Crystal systems and structures
Lecture 4 - X-ray diffraction
Lecture 5 - Crystal planes and directions
Lecture 6 - Optical microscope
Lecture 7 - Optical aberration
Lecture 8 - Metallography
Lecture 9 - Microstructure
Lecture 10 - Quantitative metallography
Lecture 11 - Crystallographic defects
Lecture 12 - Diffusion
Lecture 13 - Phase diagram - 1
Lecture 14 - Phase diagram - 2
Lecture 15 - Eutectic phase diagram
Lecture 16 - Equilibrium and non-equilibrium cooling
Lecture 17 - Equilibrium cooling of eutectic system
Lecture 18 - Solidification structure
Lecture 19 - Iron-carbon phase diagram
Lecture 20 - Nucleation and growth
Lecture 21 - TTT and CCT curves
Lecture 22 - Heat treatment
Lecture 23 - Precipitation
Lecture 24 - Elastic behaviour
Lecture 25 - Tensile test
Lecture 26 - Engineering and true stress and strain
Lecture 27 - Plastic deformation - 1
Lecture 28 - Plastic deformation - 2
Lecture 29 - Strengthening mechanism - 1

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- Lecture 30 - Strengthening mechanism - 2
- Lecture 31 - Strengthening mechanism - 3
- Lecture 32 - Strengthening mechanism - 4
- Lecture 33 - Fracture
- Lecture 34 - Fracture
- Lecture 35 - Fatigue
- Lecture 36 - Creep
- Lecture 37 - NDT
- Lecture 38 - Ceramics, polymers, composites
- Lecture 39 - Electrical and magnetic properties
- Lecture 40 - Alloy designation and properties

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Structural Analysis of Nanomaterials

Subject Co-ordinator - Prof. Kaushik Pal

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Introduction

Lecture 2 - Structure of Materials

Lecture 3 - Imperfections in Structure of Materials

Lecture 4 - Phase Diagram

Lecture 5 - Transformation of Phases

Lecture 6 - Basic Properties

Lecture 7 - Basic Properties

Lecture 8 - Basic Properties

Lecture 9 - Basic Properties

Lecture 10 - Selection of Nanomaterials based on Applications

Lecture 11 - Introduction to X-Ray Diffraction

Lecture 12 - Diffraction Methods and Directions of XRD

Lecture 13 - Determination of Crystal Structures by XRD Patterns

Lecture 14 - Precise Parameter Measurements

Lecture 15 - Orientation of Single Crystals

Lecture 16 - Qualitative Analysis by Diffraction

Lecture 17 - Quantitative Analysis by Diffraction

Lecture 18 - Microscopic Structural Analysis of Nanomaterials - I

Lecture 19 - Microscopic Structural Analysis of Nanomaterials - II

Lecture 20 - Other Characterization Techniques

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Thermo-Mechanical and Thermo-Chemical Processes

Subject Co-ordinator - Prof. S. R. Meka

Co-ordinating Institute - IIT - Roorkee

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

Lecture 1 - Introduction to Thermomechanical Processes

Lecture 2 - Conventional Thermomechanical Processes

Lecture 3 - Non-conventional Thermomechanical Processes

Lecture 4 - Stress and Strain

Lecture 5 - Effect of Strain Rate and Temperature

Lecture 6 - Microstructure Evolution

Lecture 7 - Dynamic Recovery

Lecture 8 - Discontinuous Dynamic Recrystallization

Lecture 9 - Dynamic Recrystallization

Lecture 10 - Continuous Dynamic Recrystallization (CDRX) and Geometrical Dynamic Recrystallization (GDRX)

Lecture 11 - Stereographic Projection

Lecture 12 - Using Stereographic Projection

Lecture 13 - Crystallographic Texture

Lecture 14 - Crystallographic Texture

Lecture 15 - Crystallographic Texture

Lecture 16 - Constitutive Analysis

Lecture 17 - Constitutive Analysis

Lecture 18 - Higher Strain Rate

Lecture 19 - Constitutive Based Model

Lecture 20 - Constitutive analysis

Lecture 21 - Processing Maps

Lecture 22 - Processing Maps

Lecture 23 - Microstructure and Application

Lecture 24 - Processing Maps

Lecture 25 - Processing Maps

Lecture 26 - Equal Channel Angular Pressing (ECAP)

Lecture 27 - Friction Stir Processing (FSP)

Lecture 28 - Accumulative Roll Bonding (ARB)

Lecture 29 - Multi Axial Forging (MAF)

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

- Lecture 30 - Severe Plastic Deformation
- Lecture 31 - Overview on Thermo-Chemical treatments
- Lecture 32 - Overview on Thermo-Chemical treatments (Continued...)
- Lecture 33 - Thermodynamic aspects of thermo-chemical treatments
- Lecture 34 - Thermodynamics of Gaseous Nitriding - I
- Lecture 35 - Thermodynamics of Gaseous Nitriding - II
- Lecture 36 - Gaseous Nitriding of Pure Iron
- Lecture 37 - Gaseous Nitriding of Iron based alloys
- Lecture 38 - Duplex and Dual Phase microstructures through nitriding
- Lecture 39 - Alloying element nitride precipitation during nitriding of iron based alloys
- Lecture 40 - Kinetics of gaseous nitriding

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Welding Metallurgy

Subject Co-ordinator - Dr. Pradeep K. Jha

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to welding metallurgy
- Lecture 2 - Overview of Welding Processes
- Lecture 3 - Introduction to phase diagrams
- Lecture 4 - Phase diagram of Iron Carbon system
- Lecture 5 - Phase diagram of non ferrous metals and alloys
- Lecture 6 - Phase Transformations
- Lecture 7 - Time Temperature Transformation Diagrams
- Lecture 8 - Continuous Cooling Transformation Diagrams
- Lecture 9 - Carbon Equivalent, Schaeffler Diagrams
- Lecture 10 - Problem solving on Phase Diagrams
- Lecture 11 - Introduction to strengthening mechanism in metals
- Lecture 12 - Solid solution strengthening and grain refinement
- Lecture 13 - Precipitation Hardening and Martensite Strengthening
- Lecture 14 - Strain Hardening and Strain Ageing
- Lecture 15 - Problem solving on strengthening mechanism in metals
- Lecture 16 - Introduction to Heat treatment Processes in Welding
- Lecture 17 - Hardening and Hardenability
- Lecture 18 - Martempering and Austempering
- Lecture 19 - Case Hardening methods
- Lecture 20 - Heat treatment of Non-Ferrous metals and alloys
- Lecture 21 - Heat Sources in Welding
- Lecture 22 - Heat Flow in Welding
- Lecture 23 - Temperature Distribution in Welding
- Lecture 24 - Effect of Welding Parameters
- Lecture 25 - Metallurgical effect of Heat Flow on Welding
- Lecture 26 - Principles of Solidification in Welding
- Lecture 27 - Solute redistribution during Solidification
- Lecture 28 - Constitutional Supercooling
- Lecture 29 - Microsegregation and Banding

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

- Lecture 30 - Grain Structure during Solidification in Welding
- Lecture 31 - Distinct Zones in Fusion Welded Specimen
- Lecture 32 - Heat Affected Zone
- Lecture 33 - Properties of Heat Affect Zone
- Lecture 34 - Microstructural Products in Weldments
- Lecture 35 - Introduction to Preheat and Postweld Heat Treatment
- Lecture 36 - Preheat and Postweld Heat Treatment of Different Materials
- Lecture 37 - Residual Stresses in Welding
- Lecture 38 - Causes of Residual Stress Development in Welding
- Lecture 39 - Measurement of Residual Stresses in Weldments
- Lecture 40 - Controlling Residual Stresses in Weldments
- Lecture 41 - Introduction to Welding Distortion
- Lecture 42 - Types of Welding Distortions
- Lecture 43 - Angular Distortions in Welds
- Lecture 44 - Bowing, Buckling and Twisting in Welds
- Lecture 45 - Control of Distortion in Welds
- Lecture 46 - Introduction to Cracks in Welds
- Lecture 47 - Types of Weld Cracks
- Lecture 48 - Specific Weld Cracks
- Lecture 49 - Chevron Cracks and Reheat Cracks
- Lecture 50 - Lamellar Cracks and Stress Corrosion Cracking
- Lecture 51 - Introduction to Weldability of Metals
- Lecture 52 - Weldability of Carbon Steels
- Lecture 53 - Weldability of Alloy Steels
- Lecture 54 - Weldability of Cast Iron
- Lecture 55 - Weldability of Non Ferrous Metals and Alloys
- Lecture 56 - Introduction to Welding Defects
- Lecture 57 - Surface and Subsurface Welding Defects
- Lecture 58 - Issues in Welding
- Lecture 59 - Considerations for Fatigue Loading in Welding
- Lecture 60 - Design Features for Fatigue and Static Loading in Welding

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Modeling of Tundish Steelmaking Process in Contin

Subject Co-ordinator - Dr. Pradeep K. Jha

Co-ordinating Institute - IIT - Roorkee

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

- Lecture 1 - Introduction to Continuous Casting Process
- Lecture 2 - Role of Tundish in Continuous Casting
- Lecture 3 - Types of Continuous Casting Machine
- Lecture 4 - Components of Continuous Casting Unit
- Lecture 5 - Tundish Metallurgy
- Lecture 6 - Introduction to Physical Modeling
- Lecture 7 - Concept of Similarity in Physical Modeling
- Lecture 8 - Dimensional analysis
- Lecture 9 - Physical Modeling of Isothermal and Non-Isothermal system
- Lecture 10 - Consideration in Aqueous Modeling
- Lecture 11 - Introduction to Stimulus Response Techniques
- Lecture 12 - Characterization of Flow
- Lecture 13 - Characterization of Flow in Actual Systems
- Lecture 14 - Analysis of RTD Curves
- Lecture 15 - Plug, Mixed and Dead Regions in Tundish
- Lecture 16 - Fluid Flow Fundamentals
- Lecture 17 - Mass Conservation Equation
- Lecture 18 - Momentum Conservation Equation
- Lecture 19 - Energy Conservation Equation
- Lecture 20 - Navier Stokes Equations for Newtonian Fluid
- Lecture 21 - Introduction to Turbulence in Fluid Flow
- Lecture 22 - Characteristics of Turbulent Flow
- Lecture 23 - RANS Equations
- Lecture 24 - Turbulent Flow Calculations
- Lecture 25 - Turbulence Modeling Using $k-\epsilon$ Model
- Lecture 26 - Introduction to Heat Transfer Phenomena
- Lecture 27 - Numerical Methods for Solving Governing Equation
- Lecture 28 - Finite Volume Method for Convection and Diffusion Problems
- Lecture 29 - Different Discretization Schemes

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- Lecture 30 - Assessment of Discretization Schemes
- Lecture 31 - Elements of Mathematical Modeling in Tundish Steelmaking
- Lecture 32 - Boundary Conditions
- Lecture 33 - Flow Analysis in Tundish
- Lecture 34 - Analysis of Fluid Flow and Mixing in Tundish
- Lecture 35 - Non-isothermal Flow Considerations in Tundish
- Lecture 36 - Intermixing in Tundish
- Lecture 37 - Modeling Consideration For Inclusion Removal in Tundish - I
- Lecture 38 - Modeling Consideration For Inclusion Removal in Tundish - II
- Lecture 39 - Case Studies in Modeling of Tundish Steelmaking - 1
- Lecture 40 - Case Studies in Modeling of Tundish Steelmaking - 2

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

NPTEL Video Course - Metallurgy and Material Science - NOC: Biomaterials for Bone Tissue Engineering Applications

Subject Co-ordinator - Prof. Bikramjit Basu

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction
Lecture 2 - Biomaterial
Lecture 3 - Biocompatibility
Lecture 4 - Host response
Lecture 5 - Tissue Eng
Lecture 6 - Scaffold
Lecture 7 - Bone structure
Lecture 8 - Bone properties
Lecture 9 - Implant - I
Lecture 10 - Implant - II
Lecture 11 - Proteins
Lecture 12 - Cell structure
Lecture 13 - Bacteria structure
Lecture 14 - Antibacterial assay
Lecture 15 - Cell fate processes
Lecture 16 - Cell division
Lecture 17 - Cell differentiation
Lecture 18 - Stem cells
Lecture 19 - Osseointegration
Lecture 20 - In vivo testing
Lecture 21 - Cell-material interaction
Lecture 22 - Cell-signalling
Lecture 23 - In vitro testing
Lecture 24 - Cytotoxicity assays
Lecture 25 - Biocompatibility assay
Lecture 26 - Clinical trials - I
Lecture 27 - Clinical trials - II
Lecture 28 - Metal manufacturing
Lecture 29 - Ceramics manufacturing

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- Lecture 30 - Polymers manufacturing
- Lecture 31 - Additive manufacturing
- Lecture 32 - HA-Ti-Toughness, Cell functionality
- Lecture 33 - HA-CaTiO₃ development
- Lecture 34 - HA- BaTiO₃ Functional Prop
- Lecture 35 - HA-Ag antimicrob and cell viability
- Lecture 36 - HA-ZnO, Cell fate and antimicrobial
- Lecture 37 - Dental ceramics processing
- Lecture 38 - Sr-based glass Ceramics
- Lecture 39 - Acetabular socket (Compression mold)
- Lecture 40 - ZTA femoral ball head fabrication

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NPTEL Video Course - Metallurgy and Material Science - NOC:Iron Making

Subject Co-ordinator - Prof Govind S Gupta

Co-ordinating Institute - IISc - Bangalore

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
Lecture 34
Lecture 35
Lecture 36
Lecture 37
Lecture 38
Lecture 39 - Live Session

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Friction and Wear of Materials: Principles and Cas

Subject Co-ordinator - Prof. Dr. B. V. Manoj Kumar, Prof. Bikramjit Basu

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Tribology
- Lecture 2 - Surfaces and contacts
- Lecture 3 - Friction
- Lecture 4 - Contact temperature
- Lecture 5 - Lubrication
- Lecture 6 - Wear mechanisms
- Lecture 7 - Wear mechanisms
- Lecture 8 - Wear mechanisms
- Lecture 9 - Wear mechanisms
- Lecture 10 - Wear mechanisms
- Lecture 11 - Overview of tribological materials
- Lecture 12 - Friction and wear of metal matrix composites
- Lecture 13 - Overview
- Lecture 14 - Fabrication of engineering polymers
- Lecture 15 - Polymer Ceramic Composites for Orthopedic Applications
- Lecture 16 - Processing concepts of ceramics
- Lecture 17 - Mechanical properties of ceramics
- Lecture 18 - Fracture and toughening of brittle solids
- Lecture 19 - Sliding wear of SiC Ceramics
- Lecture 20 - Sliding wear of SiC-WC Composites
- Lecture 21 - Friction and wear of HDPE-HA-Al₂O₃
- Lecture 22 - Wear behavior of bioceramics and biocomposites
- Lecture 23 - Tribological behavior of dental restorative materials
- Lecture 24 - Wear of transformation toughened zirconia
- Lecture 25 - Fretting wear of SiAlON Ceramics
- Lecture 26 - Tribochemistry in wear of cermets
- Lecture 27 - Overview
- Lecture 28 - Wear of YSZ nanoceramics
- Lecture 29 - Wear behavior of nanostructured WC-ZrO₂ nanocomposites

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- Lecture 30 - Erosive wear of SiC-WC composites
- Lecture 31 - Overview
- Lecture 32 - Sliding wear of alumina ceramics and zirconia ceramics in cryogenic environment
- Lecture 33 - Sliding wear of silicon carbide in cryogenic environment
- Lecture 34 - Wear of TiB₂ Ceramic Composites
- Lecture 35 - Erosive wear of ultra-high temperature NbB₂-based ceramic composites
- Lecture 36 - Erosive wear of ultra-high temperature ZrB₂-based ceramic composites
- Lecture 37 - Computational analysis in assessing wear
- Lecture 38 - Basics of ceramics coating techniques
- Lecture 39 - Erosive wear of WC-Co coating
- Lecture 40 - Abrasive wear of WC-Co coating