

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
Lecture 33 - Module 6
Lecture 34 - Module 6
Lecture 35 - Module 6
Lecture 36 - Module 7
Lecture 37 - Module 7
Lecture 38 - Module 8
Lecture 39 - Module 8
Lecture 40 - Module 8
Lecture 41 - Module 8
Lecture 42 - Module 9
Lecture 43 - Module 9
Lecture 44 - Module 9
Lecture 45 - Module 9
Lecture 46 - Module 10
Lecture 47 - Module 10
Lecture 48 - Module 10
Lecture 49 - Module 10
Lecture 50 - Module 10
Lecture 51 - Module 11
Lecture 52 - Module 11
Lecture 53 - Module 11
Lecture 54 - Module 11
Lecture 55 - Module 12
Lecture 56 - Module 12
Lecture 57 - Module 12
Lecture 58 - Module 12
Lecture 59 - Module 12
Lecture 60 - Module 13
Lecture 61 - Module 13
Lecture 62 - Module 13
Lecture 63 - Module 13
Lecture 64 - Module 13
Lecture 65 - Module 14
Lecture 66 - Module 14
Lecture 67 - Module 14
Lecture 68 - Module 14

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Lecture 69 - Module 15
Lecture 70 - Module 15
Lecture 71 - Module 16
Lecture 72 - Module 16
Lecture 73 - Module 16
Lecture 74 - Module 16
Lecture 75 - Module 17
Lecture 76 - Module 17
Lecture 77 - Module 18
Lecture 78 - Module 18
Lecture 79 - Module 18
Lecture 80 - Module 18
Lecture 81 - Module 19
Lecture 82 - Module 19
Lecture 83 - Module 20
Lecture 84 - Module 20
Lecture 85 - Module 21
Lecture 86 - Module 21
Lecture 87 - Module 22

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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

Lecture 147 - Sub-Critical crack growth

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NPTEL Video Course - Metallurgy and Material Science - NOC:Crystals, Symmetry and Tensors

Subject Co-ordinator - Prof. Rajesh Prasad

Co-ordinating Institute - IIT - Delhi

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

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

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Lecture 30 (9d)
Lecture 31 (10a)
Lecture 32 (10b)
Lecture 33 (11a)
Lecture 34 (11b)
Lecture 35 (11c)
Lecture 36 (11d)
Lecture 37 (12a)
Lecture 38 (12b)
Lecture 39 (13a)
Lecture 40 (13b)
Lecture 41 (14a)
Lecture 42 (14b)
Lecture 43 (15a)
Lecture 44 (15b)
Lecture 45 (15c)
Lecture 46 (16a)
Lecture 47 (16b)
Lecture 48 (17)
Lecture 49 (18a)
Lecture 50 (18b)
Lecture 51 (18c)
Lecture 52 (18d)
Lecture 53 (19a)
Lecture 54 (19b)
Lecture 55 (19c)
Lecture 56 (19d)
Lecture 57 (20a)
Lecture 58 (20b)
Lecture 59 (20c)
Lecture 60 (20d)
Lecture 61 (20e)
Lecture 62 (21a)
Lecture 63 (21b)
Lecture 64 (21c)
Lecture 65 (21d)
Lecture 66 (21e)
Lecture 67 (22a)
Lecture 68 (22b)

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Lecture 69 (22c)
Lecture 70 (22d)
Lecture 71 (23a)
Lecture 72 (23b)
Lecture 73 (23c)
Lecture 74 (24a)
Lecture 75 (24b)
Lecture 76 (24c)
Lecture 77 (25a)
Lecture 78 (25b)
Lecture 79 (25c)
Lecture 80 (25d)
Lecture 81 (26a)
Lecture 82 (26b)
Lecture 83 (27a)
Lecture 84 (27b)
Lecture 85 (27c)
Lecture 86 (27d)
Lecture 87 (27e)
Lecture 88 (27f)
Lecture 89 (28a)
Lecture 90 (28b)
Lecture 91 (28c)
Lecture 92 (28d)
Lecture 93 (28e)

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NPTEL Video Course - Metallurgy and Material Science - NOC:Corrosion-Environmental Degradation-Surface Engineering

Subject Co-ordinator - Prof. (Hag) Harish Hirani

Co-ordinating Institute - IIT - Delhi

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

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

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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

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
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Lecture 25 - Advanced Characterization Techniques
Lecture 26 - Advanced Characterization Techniques
Lecture 27 - Advanced Characterization Techniques
Lecture 28 - Advanced Characterization Techniques
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

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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
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
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Lecture 13
Lecture 14
Lecture 15
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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

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

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

- 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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- 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

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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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 of area factor,
Lecture 17 - Explanation of corrosion events on the basis of Mixed potential theory, Effect of area factor,
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 Δs_l Physical Concept & Inter
- Lecture 12 - How to determine the value of Δs_l (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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- 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 Nabarro Valley
- Lecture 27 - Slip System+Examples
- Lecture 28 - Dislocations and Slips+Examples
- Lecture 29 - Critical resolved Shear Stress+Examples (Continued...)

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

- 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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- 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-Wilsdorf 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

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

- 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: Hierarchial Nanostructures - I
Lecture 4 - Nanomaterials: Hierarchial 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 - NOC:Mechanical Behaviour of Materials - Part I

Subject Co-ordinator - Prof. Shashank Shekhar, Prof. Sudhanshu Shekhar Singh

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction
Lecture 2 - Origin of Elasticity
Lecture 3 - Stress as a Tensor
Lecture 4 - Principal Stress
Lecture 5 - Mohr's Circle
Lecture 6 - Stress-Strain Relation
Lecture 7 - Viscoelasticity
Lecture 8 - Tensile Testing
Lecture 9 - Universal Testing Machine
Lecture 10 - Flow Stress
Lecture 11 - Yield Criteria: Basics
Lecture 12 - Yield Criteria: Tresca, Von-Mises
Lecture 13 - Effective Stress_Effective Strain
Lecture 14 - Plastic Instability
Lecture 15 - Effect of Strain-rate and Temperature
Lecture 16 - Dislocations: Discovery
Lecture 17 - Dislocations: Fundamentals
Lecture 18 - Dislocations: Characteristics
Lecture 19 - Stress and Strain Fields of Dislocations
Lecture 20 - Energy of Dislocations
Lecture 21 - Dislocation Motion Glide
Lecture 22 - Cross-slip of Dislocations
Lecture 23 - Climb motion of Dislocations
Lecture 24 - Steps in Dislocations
Lecture 25 - Slip Systems
Lecture 26 - More on Slip Systems
Lecture 27 - Critical Resolved Shear Stress
Lecture 28 - Dislocation Interactions
Lecture 29 - Image Forces

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

- Lecture 30 - Partial Dislocations
- Lecture 31 - Strengthening Mechanisms
- Lecture 32 - Precipitation Strengthening: Basic Criteria
- Lecture 33 - Precipitation Strengthening: Precipitate Characteristics
- Lecture 34 - Precipitation Strengthening: Mechanisms
- Lecture 35 - Effect of Temperature: Dispersion Strengthening
- Lecture 36 - Solid Solution Strengthening: Basics
- Lecture 37 - Solid Solution Strengthening: Interaction with Dislocations
- Lecture 38 - Solid Solution Strengthening: Yield Point Phenomenon
- Lecture 39 - Grain Boundary Strengthening
- Lecture 40 - Strain Hardening: Single Xtal and Poly Crystal Deformation, Tylor Hardening
- Lecture 41 - Strain Hardening: Dislocation Multiplication, Intersection and Locks
- Lecture 42 - Summary of Strengthening Mechanisms
- Lecture 43 - Hardness Testing
- Lecture 44 - Impact Testing
- Lecture 45 - Mechanical Behaviour of Composites

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Mechanical Behaviour of Materials - Part II

Subject Co-ordinator - Prof. Sudhanshu Shekhar Singh, Prof. Shashank Shekhar

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Theoretical Strength
Lecture 2 - Stress Based Approach (Inglis)
Lecture 3 - Energy Based Approach (Griffith)
Lecture 4 - Mode of Deformation and Stress Distribution Ahead of Crack Tip
Lecture 5 - Stress Triaxiality
Lecture 6 - Plastic Zone Size
Lecture 7 - Plastic Zone Size and Shape (Continued...)
Lecture 8 - Stress Intensity Factors for Different Geometries
Lecture 9 - Fracture Toughness
Lecture 10 - Fracture Toughness Measurement
Lecture 11 - Fracture Mechanisms
Lecture 12 - Ductile Fracture Mechanisms
Lecture 13 - Ductile Fracture Mechanisms_Tunneling
Lecture 14 - Cleavage Fracture
Lecture 15 - Fracture Mechanisms (Images)
Lecture 16 - Fatigue (Stress Parameters)
Lecture 17 - Fatigue Testing (S-N curve)
Lecture 18 - Low and High Cycle Fatigue
Lecture 19 - Fatigue Crack Initiation
Lecture 20 - Fatigue Crack Propagation
Lecture 21 - Fatigue Striations, Beachmarks and Images
Lecture 22 - Deformation of Composites
Lecture 23 - Deformation of Composites (Continued...)
Lecture 24 - Toughening of Ceramics
Lecture 25 - Fracture in Polymers
Lecture 26 - Creep Fundamentals
Lecture 27 - Creep Models

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NPTEL Video Course - Metallurgy and Material Science - NOC:Electronic Properties of the Materials: Computational

Subject Co-ordinator - Prof. Somnath Bhowmick

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

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Corrosion Protection Methods

Subject Co-ordinator - Prof. Kallol Mondal

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 (Part 1)
Lecture 41 (Part 2)

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Phase Diagrams in Single Component and Binary Systems

Subject Co-ordinator - Prof. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction to phase diagram
Lecture 2 - Definition of important terms
Lecture 3 - Understanding of thermodynamic equilibrium - I
Lecture 4 - Understanding of thermodynamic equilibrium - II
Lecture 5 - Understanding of thermodynamic equilibrium - III
Lecture 6 - Understanding of thermodynamic equilibrium - IV
Lecture 7 - Significance of chemical potential in phase equilibrium
Lecture 8 - Phase equilibrium in H₂O system - Part 1
Lecture 9 - Phase equilibrium in H₂O system - Part 2
Lecture 10 - Part A - Phase equilibrium in H₂O system - Part 3
Lecture 11 - Part B - Phase equilibrium in H₂O system - Part 4
Lecture 12 - Practical importance of water phase diagram
Lecture 13 - Solution thermodynamics - Part I
Lecture 14 - Solution thermodynamics - Part II
Lecture 15 - Solution thermodynamics - Part III
Lecture 16 - Solution thermodynamics - Part IV
Lecture 17 - Solution thermodynamics - Part V
Lecture 18 - Solution thermodynamics - part VI
Lecture 19 - solution thermodynamics - part VII
Lecture 20 - Graphical understanding of free energy and composition of condensed solutions - Part 1
Lecture 21 - Graphical understanding of free energy and composition of condensed solutions - Part 2
Lecture 22 - Free energy composition plots and evolution of phase diagram for condensed solution - I
Lecture 23 - Free energy composition plots and evolution of phase diagram for condensed solution - II
Lecture 24 - Free energy composition plots and evolution of phase diagram for condensed solution - III
Lecture 25 - Free energy composition plots and evolution of phase diagram for condensed solution - IV
Lecture 26 - Free energy composition plots and evolution of phase diagram for condensed solution - V
Lecture 27 - Isomorphous phase diagram, tie line, and lever rule
Lecture 28 - Calculation of phase diagram - Part I
Lecture 29 - Calculation of phase diagram - Part II

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- Lecture 30 - Introduction to the non-ideal solutions
- Lecture 31 - The quasi-chemical approach
- Lecture 32 - Quasi-chemical approach to obtain change in enthalpy in regular solutions
- Lecture 33 - Effect of enthalpy change in change in Gibbs free energy - Part 1
- Lecture 34 - Effect of enthalpy change in change in Gibbs free energy - Part 2
- Lecture 35 - Effect of enthalpy change in change in Gibbs free energy and final Gibbs free energy - I
- Lecture 36 - Effect of enthalpy change in change in Gibbs free energy and final Gibbs free energy - II
- Lecture 37 - Effect of enthalpy change in change in Gibbs free energy and final Gibbs free energy - III
- Lecture 38 - Free energies of liquid and solid solutions
- Lecture 39 - Phase diagram on the basis of enthalpy of mixing of solid and liquid solutions - I
- Lecture 40 - Phase diagram on the basis of enthalpy of mixing of solid and liquid solutions - II
- Lecture 41 - Phase diagram on the basis of enthalpy of mixing of solid and liquid solutions - III
- Lecture 42 - Eutectic, peritectic, and eutectoid phase diagrams - Part 1
- Lecture 43 - Eutectic, peritectic, and eutectoid phase diagrams - Part 2
- Lecture 44 - Phase rule - Part I
- Lecture 45 - Derivation of phase rule

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Artificial Intelligence and Machine Learning in Ma

Subject Co-ordinator - Prof. Krishanu Biswas

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction to the course - I
Lecture 2 - Introduction to the course - II
Lecture 3 - Introduction to AI - I
Lecture 4 - Introduction to AI - II
Lecture 5 - Basics of Materials Science - I
Lecture 6 - Basics of Materials Science - II
Lecture 7 - Basics of Materials Science - III
Lecture 8 - Basics of Materials Science - IV
Lecture 9 - Part 1 - Basics of Materials Science - V
Lecture 10 - Part 2 - Basics of Materials Science - VI
Lecture 11 - Part 1 - Basics of Materials Science - VII
Lecture 12 - Part 2 - Basics of Materials Science - VIII
Lecture 13 - Part 1 - Basics of Materials Science - IX
Lecture 14 - Part 2 - Basics of Materials Science - X
Lecture 15 - Part 1 - Basics of Materials Science - XI
Lecture 16 - Part 2 - Basics of Materials Science - XII
Lecture 17 - Part 1 - Basics of Materials Science - XIII
Lecture 18 - Part 2 - Basics of Materials Science - XIV
Lecture 19 - Part 1 - Basics of Materials Science - XV
Lecture 20 - Part 2 - Basics of Materials Science - XVI
Lecture 21 - Part 1 - Basics of Materials Science - XVII
Lecture 22 - Part 2 - Basics of Materials Science - XVIII
Lecture 23 - Part 1 - Basics of Materials Science - XIX
Lecture 24 - Part 2 - Basics of Materials Science - X
Lecture 25 - Part 1 - Basics of Materials Science - XI
Lecture 26 - Part 2 - Basics of Materials Science - XII
Lecture 27 - Part 1 - Basics of Materials Science - XIII
Lecture 28 - Part 2 - Basics of Materials Science - XIV
Lecture 29 - Part 1 - Machine Learning Algorithms - I

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Lecture 30 - Part 2 - Machine Learning Algorithms - II
Lecture 31 - Part 1 - Machine Learning Algorithms - III
Lecture 32 - Part 2 - Machine Learning Algorithms - IV
Lecture 33 - Part 1 - Machine Learning Algorithms - V
Lecture 34 - Part 2 - Machine Learning Algorithms - VI
Lecture 35 - Part 1 - Machine Learning Algorithms - VII
Lecture 36 - Part 2 - Machine Learning Algorithms - VIII
Lecture 37 - Part 1 - Machine Learning Algorithms - IX
Lecture 38 - Part 2 - Machine Learning Algorithms - X
Lecture 39 - Part 1 - Machine Learning Algorithms - XI
Lecture 40 - Part 2 - Machine Learning Algorithms - XII
Lecture 41 - Part 1 - Machine Learning Algorithms - XIII
Lecture 42 - Part 2 - Machine Learning Algorithms - XIV
Lecture 43 - Part 1 - Machine Learning Algorithms - XV
Lecture 44 - Part 2 - Machine Learning Algorithms - XVI
Lecture 45 - Part 1 - Machine Learning Algorithms - XVII
Lecture 46 - Part 2 - Machine Learning Algorithms - XVIII
Lecture 47 - Part 1 - Deep Learning Methods - I
Lecture 48 - Part 2 - Deep Learning Methods - II
Lecture 49 - Part 1 - Deep Learning Methods - III
Lecture 50 - Part 2 - Deep Learning Methods - IV
Lecture 51 - Part 1 - Deep Learning Methods - V
Lecture 52 - Part 2 - Deep Learning Methods - VI
Lecture 53 - Part 1 - Deep Learning Methods - VII
Lecture 54 - Part 2 - Deep Learning Methods - VIII
Lecture 55 - Part 1 - Materials Design at Different Length Scale - I
Lecture 56 - Part 2 - Materials Design at Different Length Scale - II
Lecture 57 - Part 1 - Materials Design at Different Length Scale - III
Lecture 58 - Part 2 - Materials Design at Different Length Scale - IV
Lecture 59 - Part 1 - Materials Design at Different Length Scale - V
Lecture 60 - Part 2 - Materials Design at Different Length Scale - VI
Lecture 61 - Part 1 - Molecular Dynamic Simulation
Lecture 62 - Part 2 - Molecular Dynamic Simulation
Lecture 63 - Part 1 - Density Function Theory (DFT)
Lecture 64 - Part 2 - Density Function Theory (DFT)
Lecture 65 - Part 1 - Advanced Deep Learning - I
Lecture 66 - Part 2 - Advanced Deep Learning - II
Lecture 67 - Part 1 - Advanced Deep Learning - III
Lecture 68 - Part 2 - Advanced Deep Learning - IV

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Lecture 69 - Part 1 - Data Preprocessing and Error Analyses - I
Lecture 70 - Part 2 - Data Preprocessing and Error Analyses - II
Lecture 71 - Part 1 - Material Informatics - I
Lecture 72 - Part 2 - Material Informatics - II
Lecture 73 - Part 1 - Materials Knowledge and Materials Data Science, Material Informatics - I
Lecture 74 - Part 2 - Materials Knowledge and Materials Data Science, Material Informatics - II
Lecture 75 - Part 1 - Materials knowledge and materials data science, Material informatics - III
Lecture 76 - Part 2 - Materials Knowledge and Materials Data Science, Material Informatics - IV
Lecture 77 - Part 1 - Materials Knowledge and Materials Data Science, Material Informatics - V
Lecture 78 - Part 2 - Conclusion

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Metallurgical and Electronic Waste Recycling

Subject Co-ordinator - Prof. Arunabh Meshram

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction to Materials Recycling
Lecture 2 - Classification of Metallurgical and Electronic Wastes - Part 1
Lecture 3 - Classification of Metallurgical and Electronic Wastes - Part 2
Lecture 4 - Importance of Unit Operations - Part 1
Lecture 5 - Importance of Unit Operations - Part 2
Lecture 6 - Pretreatments in Recycling
Lecture 7 - Pyrometallurgy
Lecture 8 - Electrometallurgy
Lecture 9 - Hydrometallurgy
Lecture 10 - Refining
Lecture 11 - Aluminium dross recycling
Lecture 12 - Spent pot lining recycling
Lecture 13 - Red mud recycling
Lecture 14 - Aluminium scrap recycling
Lecture 15 - Salt slag recycling
Lecture 16 - Copper Smelter Slag recycling
Lecture 17 - Copper Smelter Slag and Raffinate recycling
Lecture 18 - Raffinate recycling (Continued...)
Lecture 19 - Spent Electrolyte recycling
Lecture 20 - Copper scrap recycling
Lecture 21 - Zinc ash recycling
Lecture 22 - Zinc ash and zinc dross recycling
Lecture 23 - Zinc dross recycling (Continued...)
Lecture 24 - Zinc dust recycling
Lecture 25 - Zinc dust and zinc scrap recycling
Lecture 26 - Ironmaking slag recycling
Lecture 27 - Ironmaking and steelmaking slag recycling
Lecture 28 - Steelmaking slag recycling (Continued...)
Lecture 29 - Steel scrap recycling

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- Lecture 30 - Wastewater recycling
- Lecture 31 - Recycling of E-Waste
- Lecture 32 - Waste Printed Circuit Boards (WPCBs) recycling
- Lecture 33 - WPCBs recycling: Delamination
- Lecture 34 - WPCBs recycling: Pyrometallurgical processes
- Lecture 35 - WPCBs recycling: Hydrometallurgical processes
- Lecture 36 - Battery Recycling: Ni-based batteries
- Lecture 37 - Battery Recycling: Lead-acid batteries
- Lecture 38 - Battery Recycling: Zinc-based batteries
- Lecture 39 - Battery Recycling: Li-ion batteries
- Lecture 40 - Environmental Impacts of Recycling
- Lecture 41 - Conclusion

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Crystal Symmetry, X-Ray Diffraction and Physical Properties of Metals

Subject Co-ordinator - Prof. Sandeep Sangal

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Lattice and Translation Symmetry
- Lecture 2 - Lattice, Motif, Crystals and Unit Cells
- Lecture 3 - Crystallographic Patterns
- Lecture 4 - Crystal Systems in 3D
- Lecture 5 - Crystals Based on 3D
- Lecture 6 - Miller Indices for Directions in Lattice Space
- Lecture 7 - Miller Indices for Planes in Lattice Space
- Lecture 8 - Interplanar Spacing
- Lecture 9 - Properties of Planes and Directions in a Cubic Unit Cell
- Lecture 10 - Weiss Zone Law
- Lecture 11 - Translation and Point Symmetries
- Lecture 12 - Restrictions on Rotational Symmetries
- Lecture 13 - 2D Crystal Systems and Lattices - I
- Lecture 14 - 2D Crystal Systems and Lattices - II
- Lecture 15 - What is a Group ?
- Lecture 16 - Point Groups - I
- Lecture 17 - Point Groups - II
- Lecture 18 - Matrix Representations of Rotation Operation
- Lecture 19 - Matrix Operation of Reflection Operation
- Lecture 20 - Combination of two mirrors
- Lecture 21 - The 10 2D Point Groups and their notations
- Lecture 22 - Combining Translation with Point Symmetries - I
- Lecture 23 - Combining Translation with Point Symmetries - II
- Lecture 24 - Combining Rotation and Translation Symmetries
- Lecture 25 - Plane Groups - I
- Lecture 26 - Plane Groups - II : Glide Planes
- Lecture 27 - Plane Groups - III : Glide Planes
- Lecture 28 - Hexagonal Plane Groups based on the Point Symmetry 3m
- Lecture 29 - Derivation of the Remaining Plane Groups

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- Lecture 30 - Decoding the International Tables - I
- Lecture 31 - Combination of Three Rotation Axes in 3D
- Lecture 32 - Combination of Three Rotation Axes in 3D - I
- Lecture 33 - Combination of Three Rotation Axes in 3D - II
- Lecture 34 - Stereographic Projection: Stereograms of Point Groups
- Lecture 35 - The 32 Point Groups in 3D
- Lecture 36 - Derivation of 3D - Bravais Lattices
- Lecture 37 - Introduction to Space Groups
- Lecture 38 - Space Groups: Screw Axes
- Lecture 39 - Space Groups: Glide Planes
- Lecture 40 - Decoding the International Tables - II
- Lecture 41 - DVD as a Diffraction Grating
- Lecture 42 - X-Ray Diffraction: Bragg's Law
- Lecture 43 - Scattering of X-Rays: The Laue Equations - I
- Lecture 44 - Scattering of X-Rays: The Laue Equations - II
- Lecture 45 - The Structure Factor
- Lecture 46 - Structure Factor Calculations
- Lecture 47 - Structure Factor Calculations
- Lecture 48 - The Reciprocal Lattice
- Lecture 49 - Application of Reciprocal Lattice in Crystal Geometry
- Lecture 50 - Reciprocal Lattice Examples
- Lecture 51 - Reciprocal Lattice and Diffraction
- Lecture 52 - X-Ray Diffraction Techniques
- Lecture 53 - Analysis of Diffraction Pattern for a Cubic Crystal - I
- Lecture 54 - Analysis of Diffraction Pattern for a Cubic Crystal - II
- Lecture 55 - Decoding the International Tables - III
- Lecture 56 - Tensor Representation of Physical Properties
- Lecture 57 - Tensor Properties, Symmetry and Neumann's Principle
- Lecture 58 - Transformation of Second Rank Tensor
- Lecture 59 - Effect of Crystal Symmetry on Second Rank Property Tensor - I
- Lecture 60 - Effect of Crystal Symmetry on Second Rank Property Tensor - II
- Lecture 61 - Effect of Crystal Symmetry on Second Rank Property Tensor - III
- Lecture 62 - Third Rank Piezoelectric Property Tensor - I
- Lecture 63 - Third Rank Piezoelectric Property Tensor - II
- Lecture 64 - Fourth Rank Elasticity Tensor

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

Subject Co-ordinator - Prof. Niraj Mohan Chawake

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Elasticity: Introduction Definition and Units
- Lecture 2 - Engineering Stress Strain Curve and Measures of Strength
- Lecture 3 - Measures of Ductility, UTS and Necking
- Lecture 4 - True Stress - True Strain Curve and Necking Criterion
- Lecture 5 - Atomistic Basis of Elasticity
- Lecture 6 - Stress at a point and Poisson's Ratio
- Lecture 7 - Normal Stresses and Shear Stresses
- Lecture 8 - Independence of stress components
- Lecture 9 - Plane stress transformation equations in 2D
- Lecture 10 - Mohr's Circle of stress
- Lecture 11 - Principal stresses and Principal planes
- Lecture 12 - Principal stresses in 3D and stress invariants
- Lecture 13 - Stress Tensor: Transformation and Hydrostatic and Deviatoric stress state
- Lecture 14 - Concept of Strain - Normal strain and shear strain
- Lecture 15 - State of Strain at a Point - Displacement, Rotation and Strain Tensors
- Lecture 16 - Elastic Constants and Elastic Stress - Strain Relations
- Lecture 17 - Anisotropy of Elastic Behavior
- Lecture 18 - Elastic Constants and Symmetry
- Lecture 19 - Yielding Criteria
- Lecture 20 - Atomistic Mechanisms of Yielding and Slip
- Lecture 21 - Resolved Shear Stress and Schmid's law
- Lecture 22 - Maximum Shear Strength of Crystalline Materials
- Lecture 23 - Dislocations: Edge and Screw
- Lecture 24 - Mixed Dislocation and Burgers Circuit
- Lecture 25 - Peierls-Nabarro Stress
- Lecture 26 - Geometrical Properties of Dislocations
- Lecture 27 - Dislocation Motions: Glide, Cross-Slip and Climb
- Lecture 28 - Plastic Strain and Dislocation Motion
- Lecture 29 - Forces on dislocations: Peach Kohler Equation

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- Lecture 30 - Stress Field around a Screw Dislocations
- Lecture 31 - Stress Field around an Edge Dislocation
- Lecture 32 - Strain Energy of a Dislocation
- Lecture 33 - Dislocation Dissociation and Dislocation Line Tension
- Lecture 34 - Strain Hardening and Dislocations Interactions
- Lecture 35 - Dislocation Interaction: Stable Configurations and Strain Hardening
- Lecture 36 - Dislocation: Nucleation and Frank Read Source
- Lecture 37 - Partial Dislocations and Stacking Faults in FCC
- Lecture 38 - Dislocation Locks: Lomer-Cottrell Lock
- Lecture 39 - Ordered Structures: Superlattice Dislocations and APBs
- Lecture 40 - Dislocation and Stacking Sequence in BCC
- Lecture 41 - Intersection of Dislocations: Jogs and Kinks
- Lecture 42 - Strain Hardening stages in an FCC Single Crystal
- Lecture 43 - Independent Slip Systems: Von Mises Criterion for Plasticity
- Lecture 44 - Solid Solutions Strengthening (SSS)
- Lecture 45 - Solid Solutions Strengthening: Interaction of Solutes and Defects
- Lecture 46 - Cottrell Atmosphere and Yield Point Phenomenon
- Lecture 47 - Precipitation Hardening and Dispersion Strengthening
- Lecture 48 - Grain Size Strengthening
- Lecture 49 - Dislocation model for grain boundaries
- Lecture 50 - Twinning in Crystalline Materials
- Lecture 51 - Fracture and Theoretical Cohesive Strength of Materials
- Lecture 52 - Fracture and Theoretical Cohesive Strength of Materials
- Lecture 53 - Fracture modes and Stress Concentration
- Lecture 54 - Fracture Mechanics - LEFM vs EPFM and J-Integral
- Lecture 55 - Creep Deformation of Materials
- Lecture 56 - Deformation Mechanics Map and Superplasticity
- Lecture 57 - Fatigue of Materials: Introduction and SN Curve
- Lecture 58 - Fatigue Stages and Paris Law
- Lecture 59 - Cyclic Stress-Strain Curve and Strain Life Curve
- Lecture 60 - Effect of Mean Stress and Stress Amplitude
- Lecture 61 - Hardness of Materials
- Lecture 62 - Impact Testing of Materials
- Lecture 63 - Anelastic Behaviour and Composite Materials

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Introductory Materials Informatics

Subject Co-ordinator - Prof. Krishanu Biswas, Prof. Pratik Kumar Ray

Co-ordinating Institute - IIT Kanpur, IIT - Ropar

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

Lecture 1 - General Introduction - Part 1
Lecture 2 - General Introduction - Part 2
Lecture 3 - Statistics and Regression - Part 1
Lecture 4 - Statistics and Regression - Part 2
Lecture 5 - Probability and Classification - Part 1
Lecture 6 - Probability and Classification - Part 2
Lecture 7 - Data Handling-I : Part 1
Lecture 8 - Data Handling-I : Part 2
Lecture 9 - Data Handling-II : Part 1
Lecture 10 - Data Handling-II : Part 2
Lecture 11 - Materials Informatics in Action - Part 1
Lecture 12 - Materials Informatics in Action - Part 2
Lecture 13 - The Gradient Descent Methods - Part 1
Lecture 14 - The Gradient Descent Methods - Part 2
Lecture 15 - Regularization and solvers in regression
Lecture 16 - Regularization and solvers in regression
Lecture 17 - Various Types of Machine Learning - Part 1
Lecture 18 - Various Types of Machine Learning - Part 2
Lecture 19 - Describing the Problems - Part 1
Lecture 20 - Describing the Problems - Part 2
Lecture 21 - Linear Models - Part 1
Lecture 22 - Linear Models - Part 2
Lecture 23 - Decisions Tree - Part 1
Lecture 24 - Decisions Tree - Part 2
Lecture 25 - Decision Trees - Part 1
Lecture 26 - Support Vector Machine - Part 1
Lecture 27 - Support Vector Machine - Part 2
Lecture 28 - Support Vector Machine and Neural Networks - Part 2
Lecture 29 - Neural Networks - Part 1

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Lecture 30 - Neural Networks - Part 2
Lecture 31 - Clustering - Part 1
Lecture 32 - Clustering - Part 2
Lecture 33 - Model Selection - Part 1
Lecture 34 - Clustering - Part 2
Lecture 35 - Visualization - Part 1
Lecture 36 - Visualization and transformation - Part 2
Lecture 37 - Dataset transformations - Part 1
Lecture 38 - Dataset transformations - Part 2
Lecture 39 - Data mining - Part 1
Lecture 40 - Mapping of materials - Part 2
Lecture 41 - Data in Materials Informatics - Part 1
Lecture 42 - Data in Materials Informatics - Part 2
Lecture 43 - Structure Maps - Part 1
Lecture 44 - Structure Maps - Part 2
Lecture 45 - Phase Diagrams - Part 1
Lecture 46 - Periodic Table and Elemental Descriptors - Part 2
Lecture 47 - Featurization - Physical Principles - Part 1
Lecture 48 - Featurization - Pair Plots and Correlation Matrix - Part 2
Lecture 49 - Thermodynamic Features - Miedema's Model
Lecture 50 - Structure of Materials - Part 1
Lecture 51 - Structure of Materials - Microstructure - Part 2
Lecture 52 - Prediction of Composition Based Properties - Part I
Lecture 53 - Prediction of Composition Based Properties - Part II
Lecture 54 - Molecular Fingerprints - Part I
Lecture 55 - Molecular Fingerprints - Part II
Lecture 56 - Mathematical Microstructure - Part 1
Lecture 57 - The Microstructure Function - Part 2
Lecture 58 - Two-point Statistics and Dimensionality Reduction
Lecture 59 - Combinatorial-Materials-Science
Lecture 60 - Convolutional Neural Network
Lecture 61 - Microstructure Representation-Synthetic Microstructures
Lecture 62 - P-S-P Linkage
Lecture 63 - Decision Making and Interpretation
Lecture 64 - Setting up ML problems - Part 1
Lecture 65 - Interrogating Machine Learning models - Examples - Part 2
Lecture 66 - Physically Informed Neural Networks
Lecture 67 - Combinatorial Materials Processing
Lecture 68 - High throughput Characterization

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Lecture 69 - Synthetic Data

Lecture 70 - Conclusion, Challenges and Future Directions

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Phase Diagrams in Single Component and Binary Systems

Subject Co-ordinator - Prof. Kallol Mondal

Co-ordinating Institute - IIT Kanpur

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

- Lecture 1 - Introduction - I
- Lecture 2 - Introduction - II
- Lecture 3 - Definition of thermodynamic terms
- Lecture 4 - Understanding of thermodynamic equilibrium - I
- Lecture 5 - Understanding of thermodynamic equilibrium - II
- Lecture 6 - Understanding of thermodynamic equilibrium - III
- Lecture 7 - Concept of Entropy - I
- Lecture 8 - Concept of Entropy - II
- Lecture 9 - Concept of Entropy - III
- Lecture 10 - Concept of equilibrium based on entropy and internal energy
- Lecture 11 - Concept of equilibrium based on auxiliary functions
- Lecture 12 - Equilibrium Condition - Helmholtz Free Energy
- Lecture 13 - Equilibrium Condition - Gibbs Free Energy
- Lecture 14 - Phase equilibria - consideration of chemical potential - I
- Lecture 15 - Phase equilibria - consideration of chemical potential - II
- Lecture 16 - Phase equilibria in H₂O system - Clapeyron Equation
- Lecture 17 - Phase equilibria in H₂O system - Practical examples and ΔG calculations for given T
- Lecture 18 - Phase equilibria in H₂O system - Clausius-Clapeyron Equation
- Lecture 19 - Phase equilibria in H₂O system - Hierarchy of Equilibrium/Stability - I
- Lecture 20 - Phase equilibria in H₂O system - Hierarchy of Equilibrium/Stability - II
- Lecture 21 - Phase equilibria in H₂O system - G vs P plot at constant Temperature
- Lecture 22 - Understanding the G vs T Plot for the Iron (Fe)
- Lecture 23 - Multicomponent Systems - Concept of Standard State
- Lecture 24 - Multicomponent Systems - Mixing of Ideal Gases
- Lecture 25 - Multicomponent Systems - Calculation of ΔH_{mix} , ΔG_{mix} , and ΔS_{mix} , for Ideal Gas Systems - I
- Lecture 26 - Multicomponent Systems - Calculation of ΔH_{mix} , ΔG_{mix} , and ΔS_{mix} , for Ideal Gas Systems - II
- Lecture 27 - Condensed Solution - Analysing Gibbs Free Energy of Mixing
- Lecture 28 - Condensed Solution - Understanding Raoult's Law
- Lecture 29 - Condensed Solution - Understanding Henry's Law

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- Lecture 30 - Condensed Solution - Calculation of \hat{H}_{mix}
- Lecture 31 - Condensed Solution - Calculation of \hat{H}_{mix} , \hat{G}_{mix} , \hat{S}_{mix} , and \hat{V}_{mix}
- Lecture 32 - Condensed Solution - Understanding the Significance of \hat{H}_{mix} , \hat{G}_{mix} , \hat{S}_{mix} , and \hat{V}_{mix}
- Lecture 33 - Condensed Ideal Solution - Graphical Representation of \hat{H}_{mix} , \hat{S}_{mix} , and \hat{G}_{mix}
- Lecture 34 - Condensed Ideal Solution - Graphical Representation of \hat{G}_{mix} , \hat{G}^E_{MA} and \hat{G}^E_{MB}
- Lecture 35 - Condensed Ideal Solution - Graphical Representation of Gibbs Free Energy of Solution
- Lecture 36 - Condensed Ideal Solution - Graphical Representation of Partial Molar Gibbs Free Energy of Component
- Lecture 37 - Condensed Ideal Solution- Common Tangent and Concept of Equilibrium between Two Phases
- Lecture 38 - Understanding Isomorphous Phase Diagram - I
- Lecture 39 - Understanding Isomorphous Phase Diagram - II
- Lecture 40 - Understanding Isomorphous Phase Diagram - Lever Rule and Fraction of Phases
- Lecture 41 - Calculation of Isomorphous Phase Diagram - I
- Lecture 42 - Calculation of Isomorphous Phase Diagram - II
- Lecture 43 - Calculation of Isomorphous Phase Diagram - III
- Lecture 44 - Deviation from Ideality- Formation of Solution
- Lecture 45 - Non-Ideal Solution- Regular Solution Model and Expression of \hat{H}_{mix} - I
- Lecture 46 - Non-Ideal Solution- Regular Solution Model and Expression of \hat{H}_{mix} - II
- Lecture 47 - Enthalpy of mixing (\hat{H}_{mix}) and Gibbs Free Energy of Mixing (\hat{G}_{mix}) - Deviation from Ideality
- Lecture 48 - Enthalpy of mixing (\hat{H}_{mix}) and Gibbs Free Energy of Mixing (\hat{G}_{mix}) - Deviation from Ideality
- Lecture 49 - Enthalpy of mixing (\hat{H}_{mix}) and Gibbs Free Energy of Mixing (\hat{G}_{mix}) - Deviation from Ideality
- Lecture 50 - Enthalpy of mixing (\hat{H}_{mix}) and Gibbs Free Energy of Mixing (\hat{G}_{mix}) - Deviation from Ideality
- Lecture 51 - Enthalpy of mixing (\hat{H}_{mix}) and Gibbs Free Energy of Mixing (\hat{G}_{mix})
- Lecture 52 - Enthalpy of mixing (\hat{H}_{mix}) and Gibbs Free Energy of Mixing (\hat{G}_{mix})
- Lecture 53 - Evolution of G-X Plot with Variation in Interaction Parameter ($\hat{\chi}$)
- Lecture 54 - Evolution of G-X Plot and associated Phase Diagram with Variation in Interaction Parameter ($\hat{\chi}$)
- Lecture 55 - Evolution of G-X Plot and associated Phase Diagram with Variation in Interaction Parameter ($\hat{\chi}$)
- Lecture 56 - Evolution of G-X Plot and associated Phase Diagram with Variation in Interaction Parameter ($\hat{\chi}$)
- Lecture 57 - Evolution of G-X Plot and associated Phase Diagram with Variation in Interaction Parameter ($\hat{\chi}$)
- Lecture 58 - Understanding Eutectic Phase Diagram
- Lecture 59 - Understanding Eutectic Phase Diagram and Partitioning and Partitionless Transformation
- Lecture 60 - Understanding Eutectoid and Peritectic Phase Diagram
- Lecture 61 - Understanding Peritectic Phase Diagram - Part A
- Lecture 62 - Understanding Complex Phase Diagrams and the Concept of Diffusion Phenomena - Part B
- Lecture 63 - Understanding Gibbs's Phase Rule

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

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

- 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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- 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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- 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 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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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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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 Resistance

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

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

- 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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- 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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- 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 pseudocapacitive 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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- 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 - NOC: Bulk Material Transport and Handling Systems

Subject Co-ordinator - Prof. Khanindra Pathak

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Classification of Mining and Bulk Solid Handling Systems
- Lecture 2 - Properties of bulk material vis-a-vis different bulk handling operations
- Lecture 3 - Fundamentals of BMH and Transport: Capacity and Productivity Concepts
- Lecture 4 - Bulk material handling in Processing plants: Crushing and Screening Flow Charts
- Lecture 5 - Introduction to Bulk Material Transport and Autonomous Vehicles
- Lecture 6 - Constructional Components: Trends of Developments
- Lecture 7 - Belt Conveyor Construction: Belting for Bulk Material Conveyor
- Lecture 8 - Idlers and Belt Cleaners
- Lecture 9 - Feeding and Discharging Devices
- Lecture 10 - Safety and Troubleshooting
- Lecture 11 - Size Selection and Power Calculation
- Lecture 12 - Principle of operations and applicability
- Lecture 13 - Basic Design Calculations
- Lecture 14 - Introduction to Pneumatic Conveying systems
- Lecture 15 - Design Calculations for Pneumatic Conveying
- Lecture 16 - Exercise with Basic Design Calculations
- Lecture 17 - Stackers and Reclaimers: Classification and Selection Criteria
- Lecture 18 - Stackers and Reclaimers: Comparison of Different Types
- Lecture 19 - Principles of Blending and Reclaiming
- Lecture 20 - Case studies of stacker and reclaimers application
- Lecture 21 - System Layout
- Lecture 22 - Introduction to Bin Bunker and Silo
- Lecture 23 - Introduction to Bunker
- Lecture 24 - Introduction to Silo
- Lecture 25 - Silo Failures and Maintenance
- Lecture 26 - Basics of Silo Design
- Lecture 27 - Feeder Selection and Design
- Lecture 28 - Crushers: Classification and selection
- Lecture 29 - Secondary Crushers

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- Lecture 30 - Screen: Classification and Selection
- Lecture 31 - Monitoring and Maintenance of Processing Plant Equipment
- Lecture 32 - Concentration and Separation
- Lecture 33 - Fine Size Classification: Desliming and Cycloning
- Lecture 34 - Froth Flotation Techniques, Magnetic Separation, Jigs and Thickeners
- Lecture 35 - Jigs and Thickeners
- Lecture 36 - Coal Washery Equipment and Practices
- Lecture 37 - Classification and Selection
- Lecture 38 - Crusher Selection and Application
- Lecture 39 - Off-Highway trucks and Haul Roads - 1
- Lecture 40 - Off-Highway trucks and Haul Roads - 2
- Lecture 41 - Recent Developments in Truck Transportation
- Lecture 42 - RopeCon Transportation
- Lecture 43 - Aerial Ropeways: Introduction
- Lecture 44 - Aerial Ropeways Calculation
- Lecture 45 - Pipe Conveyor Belt: Enclosed Material Transport
- Lecture 46 - Underground Mine Transport System
- Lecture 47 - Rope Haulage for Underground Mine Transport
- Lecture 48 - Main and Tail and Endless Rope Haulage
- Lecture 49 - Pit Top and Pit Bottom Layout
- Lecture 50 - Haulage calculation
- Lecture 51 - Locomotive
- Lecture 52 - Low Profile Dumper
- Lecture 53 - Load Haul Dumper
- Lecture 54 - Introduction to Cage and Skip Winding
- Lecture 55 - Winding Calculations
- Lecture 56 - Safety Aspects in Bulk Solid Handling and Transportation
- Lecture 57 - Safety Aspects in Bulk Solid Handling and Transportation
- Lecture 58 - Basic Introduction of Automatic Control
- Lecture 59 - Automating Bulk Solids Processes
- Lecture 60 - Online Monitoring

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Environmental Degradation and Surface Engineering

Subject Co-ordinator - Prof. Indranil Manna, Prof. Jyotsna Dutta Majumdar

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction to Materials and Environment
Lecture 2 - Genesis of Materials Degradation
Lecture 3 - Classification of degradation and Parameters Influencing it - Part I
Lecture 4 - Parameters Influencing Degradation - Part II
Lecture 5 - Engineering Solution to Combat Environmental Degradation of Materials
Lecture 6 - Aqueous corrosion-thermodynamics of Wet Corrosion
Lecture 7 - Aqueous corrosion-Classification - Part I
Lecture 8 - Aqueous corrosion-Classification - Part II
Lecture 9 - Classification of Aqueous corrosion - Part III
Lecture 10 - Classification of Aqueous corrosion - Part IV
Lecture 11 - Friction and Wear-Part - I
Lecture 12 - Friction and Wear-Part - II
Lecture 13 - Wear- Classification of wear - Part I
Lecture 14 - Wear- Classification of wear - Part II
Lecture 15 - Fatigue â Surface Dependent Property
Lecture 16 - Failure Analysis - Part I
Lecture 17 - Failure Analysis - Part II
Lecture 18 - Characteristics of Failure - Part I
Lecture 19 - Characteristics of Failure - Part II
Lecture 20 - Characteristics of Failure - Part III
Lecture 21 - Prevention
Lecture 22 - Prevention of Chemical/Electrochemical Degradation
Lecture 23 - Prevention of Chemical/Electrochemical Degradation (Continued...)
Lecture 24 - Prevention of Chemical/Electrochemical Degradation (Continued...)
Lecture 25 - Prevention of Mechanical Degradation
Lecture 26 - Non Destructive Testing
Lecture 27 - Mechanical and Electrochemical Testing - Part I
Lecture 28 - Mechanical and Electrochemical Testing - Part II
Lecture 29 - Mechanical and Electrochemical Testing - Part III

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

- Lecture 30 - Characterization
- Lecture 31 - Surface/Interface
- Lecture 32 - Scope, Classification and Objectives of Surface Engineering
- Lecture 33 - Shot Peening
- Lecture 34 - Grinding and Polishing
- Lecture 35 - Ultrasonic Peening and Laser Shock Peening
- Lecture 36 - Conventional Surface Hardening (Flame and induction)
- Lecture 37 - Pack Carburizing
- Lecture 38 - Fluidized Bed Carburizing
- Lecture 39 - Fused bath and Gas Nitriding
- Lecture 40 - Plasma Nitriding
- Lecture 41 - Diffusion Based Coatings - Solid State
- Lecture 42 - Chemical Conversion Coatings
- Lecture 43 - Electrodeposition
- Lecture 44 - Electrophoretic and Electroless deposition
- Lecture 45 - Galvanizing and Hot Dipping
- Lecture 46 - Thick Coatings by Weld Overlay and Cladding
- Lecture 47 - Introduction to thin film deposition
- Lecture 48 - Physical Vapor Deposition including Sputtering
- Lecture 49 - Chemical Vapor Deposition (CVD) and Composite Coating
- Lecture 50 - Chemical Vapor Deposition (CVD) and Composite Coating
- Lecture 51 - Spray Coating Techniques II - Plasma Spray and Cold Spray
- Lecture 52 - Ion Implantation
- Lecture 53 - Electron Beam Assisted Surface Engineering
- Lecture 54 - Laser Material Processing
- Lecture 55 - Laser Surface Engineering
- Lecture 56 - Laser Assisted Additive Manufacturing, LAM
- Lecture 57 - Strengthening Mechanisms in Surface Engineering
- Lecture 58 - Microstructural Characterization after Surface Engineering
- Lecture 59 - Compositional Characterization after Surface Engineering
- Lecture 60 - Summary of surface engineering and Conclusion

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Fracture, Fatigue and Failure of Materials

Subject Co-ordinator - Prof. Indrani Sen

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Modes of Fracture
Lecture 2 - Theoretical Strengths and Defects
Lecture 3 - Stress Concentration
Lecture 4 - Griffith Criterion
Lecture 5 - Griffith Criteria - Modification
Lecture 6 - Stress Intensity Factor
Lecture 7 - Fracture Toughness and Plane Stress-Plane Strain
Lecture 8 - Plastic Zone Size
Lecture 9 - Plane stress and plane strain fracture toughness
Lecture 10 - Plane stress and plane strain fracture toughness (Continued...)
Lecture 11 - Plane Strain Fracture Toughness Testing
Lecture 12 - Plane Strain-Plane Stress Fracture Toughness Testing
Lecture 13 - Plane Stress Fracture Toughness
Lecture 14 - Plane Stress fracture toughness-J integral
Lecture 15 - Experimental determination of JIC
Lecture 16 - J-integral and JIC
Lecture 17 - Impact Toughness
Lecture 18 - Impact Toughness (Continued...)
Lecture 19 - Impact Toughness (Continued...)
Lecture 20 - Impact Toughness (Continued...)
Lecture 21 - Impact Toughness (Continued...)
Lecture 22 - Fracture Toughness
Lecture 23 - Fracture Toughness (Continued...)
Lecture 24 - Fracture Toughness (Continued...)
Lecture 25 - Fracture Toughness (Continued...)
Lecture 26 - Fracture Toughness (Continued...)
Lecture 27 - Environment Assisted Fracture
Lecture 28 - Environment Assisted Fracture (Continued...)
Lecture 29 - Environment Assisted Fracture (Continued...)

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

- Lecture 30 - Introduction to Fatigue
- Lecture 31 - Stress Controlled Fatigue
- Lecture 32 - Stress Controlled Fatigue (Continued...)
- Lecture 33 - Stress Controlled Fatigue (Continued...)
- Lecture 34 - Stress Controlled Fatigue (Continued...)
- Lecture 35 - Strain Controlled Fatigue (Continued...)
- Lecture 36 - Strain Controlled Fatigue (Continued...)
- Lecture 37 - Strain Controlled Fatigue (Continued...)
- Lecture 38 - Strain Controlled Fatigue (Continued...)
- Lecture 39 - Fatigue Crack Nucleation
- Lecture 40 - Notch Effect
- Lecture 41 - Crack in Fatigue
- Lecture 42 - Fatigue Crack Propagation
- Lecture 43 - Fatigue Crack Propagation (Continued...)
- Lecture 44 - Fatigue Crack Propagation (Continued...)
- Lecture 45 - Fatigue Crack Propagation (Continued...)
- Lecture 46 - Fatigue Crack Propagation (Continued...)
- Lecture 47 - Fatigue Crack Propagation (Continued...)
- Lecture 48 - Fatigue in Materials
- Lecture 49 - Fatigue in Materials (Continued...)
- Lecture 50 - Effect of Temperature on Fatigue
- Lecture 51 - Failure Analysis
- Lecture 52 - Failure Analysis (Continued...)
- Lecture 53 - Failure Analysis (Continued...)
- Lecture 54 - Failure Analysis - Case study - Titanic
- Lecture 55 - Failure Analysis - Case Study - ALK
- Lecture 56 - Failure Analysis - Case study - Point Pleasant Bridge
- Lecture 57 - Failure Analysis - Case Study - Rail Crash
- Lecture 58 - Failure Analysis - Case Study - Comet
- Lecture 59 - Failure Analysis - Case Study - Columbia
- Lecture 60 - Failure Analysis - Summary

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Mine Closure and Sustainability Planning

Subject Co-ordinator - Prof. Khanindra Pathak

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to closure concept
- Lecture 2 - Mine Closure Objectives and Regulatory Aspects
- Lecture 3 - Mining Footprint and Regulatory Aspects
- Lecture 4 - Mine Closure Costs and Financing Approaches
- Lecture 5 - Decommissioning of Mines
- Lecture 6 - Demolition Techniques
- Lecture 7 - Post Closure Liabilities and Activities
- Lecture 8 - Post Closure Community Concerns and Sustainable Development Plans
- Lecture 9 - Closure oriented Resource Development-Post Mining Land Uses
- Lecture 10 - Post mining site monitoring
- Lecture 11 - Planning inputs, tools and techniques
- Lecture 12 - Tools and Techniques for Closure Plan Development and Procedures
- Lecture 13 - Closure Plan Development Procedures
- Lecture 14 - Monitoring, Review and Feedback of Closure Plan Implementation-Closure Criteria
- Lecture 15 - Failure Mode and Effect Analysis Framework for Mine Closure Planning
- Lecture 16 - Multiple Accounts Analysis (MAA) for Assessment of Closure Alternatives
- Lecture 17 - Provisioning of capital
- Lecture 18 - Closure costs and Rehabilitation Costs
- Lecture 19 - Finance and Accounting: Closure cost estimate
- Lecture 20 - Closure Economics and Audit
- Lecture 21 - Application of Remote Sensing for Mine Closure-Introduction
- Lecture 22 - Remote Sensing Sensors
- Lecture 23 - Remote Sensing media and sensors
- Lecture 24 - Image Processing and Data Interpretation
- Lecture 25 - GIS for Mine Closure: Mapping and Geo-Spatial Data Analysis
- Lecture 26 - Integration of phase operations
- Lecture 27 - Integration of Interdepartmental work and phase operations - Part 1
- Lecture 28 - Integration of Interdepartmental work and phase operations - Part 2
- Lecture 29 - Risk Analysis Techniques and Management

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

- Lecture 30 - Post Mine Closure Waste to Wealth Conversion
- Lecture 31 - CSR and EMP Integration
- Lecture 32 - Introduction to Asset Management
- Lecture 33 - Principle of Asset Management and Decommissioning of Assets for Site Restoration
- Lecture 34 - Brownfield Redevelopment and Value Addition to Assets
- Lecture 35 - Landform Design and Post Mining Asset Creation
- Lecture 36 - Concept of Sustainable Development and Mining industry
- Lecture 37 - Sustainability Measurement and Reporting
- Lecture 38 - Sustainability Measurement and Reporting (Continued...)
- Lecture 39 - Sustainable Mineral Industry
- Lecture 40 - Policy and Legislative Framework of Sustainability for SDG and Mine Closure
- Lecture 41 - Communicating sustainability performance
- Lecture 42 - Framework of Sustainability reporting
- Lecture 43 - Sustainable accounting
- Lecture 44 - Case studies on Sustainability initiatives in Mining Industry
- Lecture 45 - Data Analytics for Sustainability management
- Lecture 46 - Cleaner Production Based Closure Management
- Lecture 47 - Regenerative environment design for sustainable Mine Closure
- Lecture 48 - Reusable resource identification in post closure mine site
- Lecture 49 - Optimization of Residual Value of Assets
- Lecture 50 - Post Mining Site for Community wealth
- Lecture 51 - Management of water resources
- Lecture 52 - Soil Treatment and Revegetation
- Lecture 53 - Bio-diversity: Post Land reclamation and plantation
- Lecture 54 - Physical and Chemical Stability issues
- Lecture 55 - Economic Utilization of Post Mining Structures and assets
- Lecture 56 - Techniques for closing underground workings
- Lecture 57 - Application of Industry 4.0 for Mine
- Lecture 58 - Best mining practices for Sustainable mining - Case studies
- Lecture 59 - Stability Monitoring and Enhancing tools
- Lecture 60 - VR and AR Technology for Post Mining Mine site Visualization and Design

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

NPTEL Video Course - Metallurgy and Material Science - NOC: Fundamentals of Composite and Cellular Materials

Subject Co-ordinator - Dr. Siddhartha Roy, Dr. Tapas Laha

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Fundamental aspects of hybrid materials
Lecture 2 - Materials selection basics for design with hybrid materials
Lecture 3 - Classes of materials and material property charts
Lecture 4 - Material property charts and concept of material indices
Lecture 5 - Material property chart-indices and concept of hybridization
Lecture 6 - Hybrid materials - Composite
Lecture 7 - Cellular solids - Applications of metal foams
Lecture 8 - Cellular solids - Applications of porous ceramics and polymer foams
Lecture 9 - Basics of Composite Materials and Classification
Lecture 10 - Composite Classification - Matrix and Reinforcement
Lecture 11 - Fibers - Fundamentals, Glass fiber
Lecture 12 - Fibers - Boron and Carbon Fibers
Lecture 13 - Fibers - Aramid and Ceramic fibers, Alumina fiber
Lecture 14 - Fibers - SiC fiber and Whiskers
Lecture 15 - Metal matrix composites (MMCs) - Basic concept, Liquid state processing
Lecture 16 - Metal matrix composites (MMCs) - Liquid and Solid state processing
Lecture 17 - Ceramic Matrix Composites (CMCs) - Basic concept, Processing techniques
Lecture 18 - Ceramic Matrix Composites (CMCs) - Processing techniques
Lecture 19 - CMCs and PMCs - Processing and Application
Lecture 20 - Fabrication of cellular ceramics
Lecture 21 - Sintering of ceramics - Aspects and mechanisms
Lecture 22 - Fabrication of cellular ceramics
Lecture 23 - Processing of metal foams - Foaming techniques
Lecture 24 - Processing of metal foams (Continued...)
Lecture 25 - Processing of metal foams (Continued...)
Lecture 26 - Polymer foams - Processing and properties
Lecture 27 - Additive manufacturing - Definition and Prospects
Lecture 28 - Cellular solids classification and Structure description
Lecture 29 - Structure of cellular solids - Pore structure characterization

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

- Lecture 30 - Interfacial phenomena - Basic concept, Adhesion and Wettability
- Lecture 31 - Interfacial phenomena - Factors affecting wettability
- Lecture 32 - Interfacial phenomena - Interfacial bonding
- Lecture 33 - Interfacial phenomena - Interfacial strength measurement
- Lecture 34 - Interfacial phenomena - Case study - Al-MWCNT nanocomposite
- Lecture 35 - Interfacial phenomena - Case studies: MMCs and CMCs
- Lecture 36 - Interfacial phenomena - Case studies: MMCs and CMCs (Continued...)
- Lecture 37 - Mechanics of Composites - Unidirectional Lamina
- Lecture 38 - Mechanics: Fiber-reinforced composites - Transverse Loading
- Lecture 39 - Mechanics: Fiber-reinforced composites - Problem Solving
- Lecture 40 - Mechanics: Fiber-reinforced composites - Discontinuous fibers
- Lecture 41 - Mechanics of Composites - Discontinuous fibers
- Lecture 42 - Dependence of properties on pore structure
- Lecture 43 - Mechanics of cellular solids
- Lecture 44 - Mechanics of cellular solids (Continued...)
- Lecture 45 - Deformation behavior of honeycomb and foams
- Lecture 46 - Deformation behaviour of Foams
- Lecture 47 - Deformation behaviour of Foams (Continued...)
- Lecture 48 - Deformation behaviour of Foams (Continued...)
- Lecture 49 - Thermal properties of foams
- Lecture 50 - Other important properties of foams (Continued...)
- Lecture 51 - Advanced composites - MMCs
- Lecture 52 - Advanced composites - MMCs (Continued...)
- Lecture 53 - Advanced composites - CMCs
- Lecture 54 - Advanced composites - Advanced Processing Techniques
- Lecture 55 - Advanced composites - Advanced Processing Techniques (Continued...)
- Lecture 56 - Advanced composites - Advanced Processing Techniques (Continued...)
- Lecture 57 - Advanced composites - Application oriented advanced composites
- Lecture 58 - Microstructure and properties of natural cellular solid - wood
- Lecture 59 - Advanced hybrid material - Functionally graded composite materials (FGMs)
- Lecture 60 - Advanced hybrid material - Functionally graded composite materials (FGMs) (Continued...)

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

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

Subject Co-ordinator - Prof. Tarun Kumar Kundu

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction, Classification and Uses of Metals
- Lecture 2 - Introduction, Classification and Uses of Metals (Continued...)
- Lecture 3 - Occurrence/Source of Metals
- Lecture 4 - Metal Extraction Process Overview
- Lecture 5 - Mineral Beneficiation: Overview and Mass Balances
- Lecture 6 - Crushing and Grinding (Comminution)
- Lecture 7 - Mineral Classification: Separation in Flowing Fluid
- Lecture 8 - Mineral Concentration by Froth Flotation
- Lecture 9 - Mineral Concentration by Froth Flotation
- Lecture 10 - Magnetic and Electric Separation/Concentration
- Lecture 11 - Sensor-based/Automatic Ore Sorting
- Lecture 12 - Solid-Liquid Separation
- Lecture 13 - Particle Size Estimation and Screening
- Lecture 14 - Fuels in Metallurgical Processes and Coal Characteristics
- Lecture 15 - Calorific Value and Caking Properties of Coal
- Lecture 16 - Coke: Making and Properties
- Lecture 17 - Combustion of Fuels
- Lecture 18 - Combustion: Mass and Heat Balance
- Lecture 19 - Combustion Heat Balance: Flame Temperature
- Lecture 20 - Combustion Heat Utilization in Furnace
- Lecture 21 - Heat Utilization in Furnace: Numerical Examples
- Lecture 22 - Classification of Furnaces
- Lecture 23 - Refractories for Furnace Linings
- Lecture 24 - Refractories: Testing and Production
- Lecture 25 - Agglomeration of Fines: Pelletization and Briquetting
- Lecture 26 - Agglomeration of Fines: Sintering
- Lecture 27 - Extraction of Metal from Sulfides: Roasting
- Lecture 28 - Roasting Reactors and Heat Balance
- Lecture 29 - Roasting: Predominance Area Diagram

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- Lecture 30 - Roasting: Application of Predominance Area Diagram
- Lecture 31 - Reduction Smelting and Matte Smelting
- Lecture 32 - Metallurgical Slag
- Lecture 33 - Slag Viscosity, Surface Tension and Theories
- Lecture 34 - Slag: Masson and Molecular Theory, Numerical Examples
- Lecture 35 - Copper Extraction: Matte Smelting
- Lecture 36 - Copper Extraction: Flash Smelting
- Lecture 37 - Cu Extraction: Cyclone Flash Smelting and Numerical Examples
- Lecture 38 - Cu Extraction: Conversion
- Lecture 39 - Conversion of Nickel Sulphide and Numerical Examples
- Lecture 40 - TSL Smelting, Continuous Conversion and Direct Cu-Production
- Lecture 41 - Reduction Smelting: Lead Extraction
- Lecture 42 - Reduction Smelting: Zinc Extraction and ISP
- Lecture 43 - Extraction of Tin, Tungsten, Molybdenum and Numerical Examples
- Lecture 44 - Extraction of Nb, V, Ferroalloys and Titania (from Ilmenite)
- Lecture 45 - Silicothermy: Pyrometallurgical Magnesium Extraction
- Lecture 46 - Reduction Smelting: Iron Extraction in Blast Furnace
- Lecture 47 - Alternative Routes of Iron Extraction
- Lecture 48 - Halide Metallurgy: Extraction of Ti, Zr, Hf, U, Si Purification
- Lecture 49 - Purification of Bulk Metals: Chemical Refining
- Lecture 50 - Chemical Refining: Purification of Lead
- Lecture 51 - Chemical Refining of Zinc, Tin, Nickel, Ti (Zr, Hf, Th)
- Lecture 52 - Physical Refining: Vacuum De-gassing, Zone Melting and Distillation
- Lecture 53 - Hydrometallurgy: Unit Steps, Leaching Reagents and Methods
- Lecture 54 - Physiochemical Aspect of Leaching, Bacterial Leaching, S/L Separation
- Lecture 55 - Hydrometallurgy: Solution Purification and Metal Ion Reduction
- Lecture 56 - Hydrometallurgy: Cementation, Electrowinning, Au Extraction and Bayer Process
- Lecture 57 - Electrometallurgy: Electrowinning, Electrorefining, Current and Energy Efficiency
- Lecture 58 - Electrometallurgy: Extraction of Mg and Al
- Lecture 59 - Environmental Concern and Sustainable Metal Extraction
- Lecture 60 - New Development in Metal Extraction: Solvometallurgy, Bio-Metallurgy, Membrane Technology

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Clean Coal Technology

Subject Co-ordinator - Prof. Barun Kumar Nandi

Co-ordinating Institute - IIT-ISM Dhanbad

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

Lecture 1 - Coal Quality Parameters
Lecture 2 - Coal Quality Parameters (Continued...)
Lecture 3 - Coal Quality Parameters (Continued...)
Lecture 4 - Coal Quality Parameters (Continued...)
Lecture 5 - Coal Quality Parameters (Continued...)
Lecture 6 - Coal Cleaning
Lecture 7 - Coal Cleaning (Continued...)
Lecture 8 - Coal Cleaning (Continued...)
Lecture 9 - Coal Cleaning (Continued...)
Lecture 10 - Coal Cleaning (Continued...)
Lecture 11 - Coal Cleaning Methods
Lecture 12 - Coal Cleaning Methods (Continued...)
Lecture 13 - Coal Cleaning Methods (Continued...)
Lecture 14 - Coal Cleaning Methods (Continued...)
Lecture 15 - Coal Cleaning Methods (Continued...)
Lecture 16 - Coal Combustion Fundamentals
Lecture 17 - Coal Combustion Fundamentals (Continued...)
Lecture 18 - Coal Combustion Fundamentals (Continued...)
Lecture 19 - Coal Combustion Fundamentals (Continued...)
Lecture 20 - Coal Combustion Fundamentals (Continued...)
Lecture 21 - Effects of Coal Properties on Combustion
Lecture 22 - Effects of Coal Properties on Combustion (Continued...)
Lecture 23 - Effects of Coal Properties on Combustion (Continued...)
Lecture 24 - Effects of Coal Properties on Combustion (Continued...)
Lecture 25 - Effects of Coal Properties on Combustion (Continued...)
Lecture 26 - Industrial Coal Combustion Methods
Lecture 27 - Industrial Coal Combustion Methods (Continued...)
Lecture 28 - Industrial Coal Combustion Methods (Continued...)
Lecture 29 - Industrial Coal Combustion Methods (Continued...)

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- Lecture 30 - Industrial Coal Combustion Methods (Continued...)
- Lecture 31 - Emission Control from Combustion Utilities
- Lecture 32 - Emission Control from Combustion Utilities (Continued...)
- Lecture 33 - Emission Control from Combustion Utilities (Continued...)
- Lecture 34 - Emission Control from Combustion Utilities (Continued...)
- Lecture 35 - Emission Control from Combustion Utilities (Continued...)
- Lecture 36 - SO_x Control Strategies
- Lecture 37 - NO_x Emission Control
- Lecture 38 - Oxy Fuel Combustion
- Lecture 39 - Carbon Dioxide Capture and Storage
- Lecture 40 - Carbon Dioxide Capture and Storage (Continued...)
- Lecture 41 - Fundamentals of Coal Gasification
- Lecture 42 - Chemical Reactions in Coal Gasification
- Lecture 43 - Fundamentals of Coal Gasification (Continued...)
- Lecture 44 - Fuel Properties and Gasification
- Lecture 45 - Scope of Coal Gasification
- Lecture 46 - Updraft and Down Draft Gasifier
- Lecture 47 - Lurgi Gasifier
- Lecture 48 - Fluidized Bed and other Gasifier
- Lecture 49 - Syn Gas Cleaning
- Lecture 50 - Coal Gasification Downstream Plants
- Lecture 51 - Coal Based Power Generation
- Lecture 52 - Coal Based Power Generation (Continued...)
- Lecture 53 - Coal Based Power Generation (Continued...)
- Lecture 54 - Coal Based Power Generation (Continued...)
- Lecture 55 - Combined Cycle Power Generation and IGCC
- Lecture 56 - Underground Coal Gasification
- Lecture 57 - Coal Bed Methane
- Lecture 58 - Coal Mine Methane
- Lecture 59 - Clean Coal Technology : Case Studies
- Lecture 60 - Clean Coal Technology : Case Studies (Continued...)

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

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

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 broadening
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

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

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

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

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

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 Feynman's talk on Nanotechnology - Part I
- Lecture 4 - Discussion on Feynman'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 - ZrO_2
- 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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NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

- 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 NPTEL 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 Dislocations - IX
Lecture 22 - Introduction to Plastic deformation - I
Lecture 23 - Introduction to Plastic deformation - II
Lecture 24 - Introduction to Plastic Deformation - III
Lecture 25 - Introduction to Plastic Deformation - IV
Lecture 26 - Introduction to Plastic Deformation - V
Lecture 27 - Introduction to Plastic Deformation - VI
Lecture 28 - Strengthening Mechanisms in Crystalline Materials - I
Lecture 29 - Strengthening Mechanisms in Crystalline Materials - II

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

Lecture 30 - Strengthening Mechanisms in Crystalline Materials - III
Lecture 31 - Strengthening Mechanisms in Crystalline Materials - IV
Lecture 32 - Strengthening Mechanisms in Crystalline Materials - V
Lecture 33 - Mechanical Testing - I
Lecture 34 - Mechanical Testing - II
Lecture 35 - Mechanical Testing - III
Lecture 36 - Mechanical Testing - IV
Lecture 37 - Mechanical Testing - V
Lecture 38 - Mechanical Testing - VI
Lecture 39 - Mechanical Testing - VII
Lecture 40 - Mechanical Testing - VIII
Lecture 41 - Mechanical Testing - IX
Lecture 42 - Mechanical Testing - X
Lecture 43 - Creep - I
Lecture 44 - Creep - II
Lecture 45 - Creep - III
Lecture 46 - Creep - IV
Lecture 47 - Creep - V
Lecture 48 - Creep - VI
Lecture 49 - Fracture Mechanics - I
Lecture 50 - Fracture Mechanics - II
Lecture 51 - Fracture Mechanics - III
Lecture 52 - Fracture Mechanics - IV
Lecture 53 - Fracture Mechanics - V
Lecture 54 - Fracture Mechanics - VI
Lecture 55 - Fracture Mechanics - VII
Lecture 56 - Fracture Mechanics - VIII
Lecture 57 - Fracture Mechanics - IX
Lecture 58 - Fracture Mechanics - X
Lecture 59 - Fracture Mechanics - XI
Lecture 60 - Fatigue - I
Lecture 61 - Fatigue - II
Lecture 62 - Fatigue - III
Lecture 63 - Fatigue - IV
Lecture 64 - Fatigue - V

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Aluminium based Alloys and Metal Matrix Composites

Subject Co-ordinator - Prof. Ranjit Bauri

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Pure Aluminium
Lecture 2 - Extraction of Aluminium
Lecture 3 - Alloy Designations
Lecture 4 - Cast Aluminium Alloys
Lecture 5 - Hypo and Hyper eutectic alloys
Lecture 6 - Modifying Al-Si alloys and Decoding Alloy Designation
Lecture 7 - Solid Solution Hardening - 1
Lecture 8 - Solid Solution Hardening - 2
Lecture 9 - Yield point phenomena and Strain aging
Lecture 10 - Cottrell-Bilby theory of strain aging
Lecture 11 - Portevinâ Le Chatelier (PLC) effect
Lecture 12 - Dynamic Strain Aging (DSA)
Lecture 13 - Features of Serrrated Flow - 1
Lecture 14 - Features of Serrrated Flow - 2
Lecture 15 - Precipitation hardening - 1
Lecture 16 - Precipitation hardening - 2
Lecture 17 - Precipitation hardening - 3
Lecture 18 - Precipitation hardening - 4
Lecture 19 - Precipitation hardening - 5
Lecture 20 - Precipitation hardening - 6
Lecture 21 - 7XXX and 8XXX Series Alloys
Lecture 22 - Strain Hardening - 1
Lecture 23 - Strain Hardening - 2
Lecture 24 - Recovery and Recrystallization
Lecture 25 - Recrystallization Mechanism
Lecture 26 - Recrystallization: Nucleation and Growth
Lecture 27 - Dynamic Recrystallization
Lecture 28 - Discontinuous and Continuous Dynamic Recrystallization
Lecture 29 - Continuous Dynamic Recrystallization

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

- Lecture 30 - Geometric Dynamic Recrystallization (GDRX)
- Lecture 31 - Grain boundary strengthening
- Lecture 32 - Grain refinement methods
- Lecture 33 - Homogeneous vs Heterogeneous Nucleation
- Lecture 34 - Grain refinement by Melt inoculation
- Lecture 35 - Mechanisms of grain refinement by melt inoculation - 1
- Lecture 36 - Mechanisms of grain refinement by melt inoculation - 2
- Lecture 37 - Melt inoculation: Fading and Poisoning
- Lecture 38 - Grain refinement by melt vibration
- Lecture 39 - Severe Plastic Deformation (SPD)
- Lecture 40 - Dynamic recrystallization in SPD
- Lecture 41 - Metal Matrix Composites
- Lecture 42 - Processing of Metal Matrix Composites
- Lecture 43 - Two-phase process, Insitu composites
- Lecture 44 - Particle wetting and Bonding
- Lecture 45 - Particle Distribution in MMCs - 1
- Lecture 46 - Particle Distribution in MMCs - 2
- Lecture 47 - Rule of Mixture - 1
- Lecture 48 - Rule of Mixture - 2
- Lecture 49 - Strengthening Mechanism in MMCs - 1
- Lecture 50 - Strengthening Mechanism in MMCs - 2
- Lecture 51 - Fracture Behavior of Fiber Reinforced Composites
- Lecture 52 - Ductile Fracture of Metals
- Lecture 53 - Fracture Behavior of Discontinuously Reinforced Composites
- Lecture 54 - Fatigue
- Lecture 55 - Fatigue Crack propagation and Growth
- Lecture 56 - Fatigue Behavior of MMCs - 1
- Lecture 57 - Fatigue Behavior of MMCs - 2
- Lecture 58 - Fatigue Behavior of MMCs - 3
- Lecture 59 - Fatigue Behavior of MMCs - 4
- Lecture 60 - Fatigue Behavior of MMCs - 5

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Welding Science and Technology (In Tamil)

Subject Co-ordinator - Prof. Murugaiyan Amirthalingam

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction and learning objectives
- Lecture 2 - Definition of welding and necessity for welding
- Lecture 3 - Classification of welding processes
- Lecture 4 - Introduction to welding arc
- Lecture 5 - Types of gas discharges
- Lecture 6 - Characteristics of a welding arc
- Lecture 7 - Role of polarity in a welding arc
- Lecture 8 - Anode and cathode fall zones
- Lecture 9 - Arc column - Part I
- Lecture 10 - Arc column - Part II
- Lecture 11 - Arc column - Part III
- Lecture 12 - Characteristics of arc welding processes
- Lecture 13 - Introduction to arc ignition and gas tungsten arc welding
- Lecture 14 - Gas tungsten arc welding - I
- Lecture 15 - Shielding gases used for arc welding
- Lecture 16 - Plasma welding
- Lecture 17 - Consumable welding processes - I
- Lecture 18 - Consumable welding processes - II
- Lecture 19 - Fundamentals of resistance welding
- Lecture 20 - Resistance spot welding - Part I
- Lecture 21 - Resistance spot welding - Part II
- Lecture 22 - Other resistance welding processes
- Lecture 23 - High energy beam welding processes - Laser beam welding
- Lecture 24 - High energy beam welding processes - Electron beam welding
- Lecture 25 - Other welding processes - Part I
- Lecture 26 - Other welding processes - Part II

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Thermodynamics and Kinetics of Materials

Subject Co-ordinator - Prof. Saswata Bhattacharya

Co-ordinating Institute - IIT - Hyderabad

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

- Lecture 1 - Basic Concepts
- Lecture 2 - Energy, Heat and Work I - Part 1
- Lecture 3 - Energy, Heat and Work II - Part 2
- Lecture 4 - Heat capacity and Enthalpy
- Lecture 5 - Heat capacity relations in materials
- Lecture 6 - Introduction to the Second law of Thermodynamics
- Lecture 7 - Clausius inequality and entropy of transformation
- Lecture 8 - First and Second Laws Combined
- Lecture 9 - Third Law, Absolute Zero, and Other Energy Functions
- Lecture 10 - Axiomatic Approach and Thermodynamic Equilibrium in Simple Systems
- Lecture 11 - Formulations of Equilibrium in Thermodynamic Systems
- Lecture 12 - Fundamental relations and alternative formulations of equilibrium criterion
- Lecture 13 - Maxwell relations and their application
- Lecture 14 - Concepts of Statistical Thermodynamics - 1
- Lecture 15 - Concepts of Statistical Thermodynamics - 2
- Lecture 16 - Thermodynamic Equilibrium in Statistical Thermodynamics
- Lecture 17 - Phase equilibria and phase transition in unary systems - 1
- Lecture 18 - Phase equilibria and phase transition in unary systems - 2
- Lecture 19 - Phase equilibria and phase transition in unary systems - 3
- Lecture 20 - Applications of Clausius-Clapeyron Equation
- Lecture 21 - Thermodynamics of solutions - 1
- Lecture 22 - Thermodynamics of solutions - 2
- Lecture 23 - Multicomponent solutions and mixing process
- Lecture 24 - Thermodynamic properties due to mixing
- Lecture 25 - Ideal and Real Solutions
- Lecture 26 - Regular solutions and thermodynamic properties of mixing
- Lecture 27 - Colligative Properties
- Lecture 28 - Quasichemical Approach and regular solutions
- Lecture 29 - Quasichemical solution model for ordered phases - I

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- Lecture 30 - Quasichemical solution model for ordered phases - II
- Lecture 31 - Phase equilibria in multiphase, multicomponent, non-reacting systems
- Lecture 32 - Binary phase diagrams and lever rule
- Lecture 33 - Binary alloy phase diagrams and invariant points
- Lecture 34 - Binary alloy phase diagrams - intermediate phases and miscibility gap
- Lecture 35 - Thermodynamics of phase diagrams - G-x curves
- Lecture 36 - Thermodynamic Stability and Numerical Modeling
- Lecture 37 - Thermodynamics of reacting systems
- Lecture 38 - Elements of thermodynamics of interfaces and thermodynamics of irreversible processes

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

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

Subject Co-ordinator - Prof. Mayur Vaidya

Co-ordinating Institute - IIT - Hyderabad

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

Lecture 1 - Diffusion in materials world
Lecture 2 - Revisiting relevant mathematical concepts
Lecture 3 - Ficks law of Diffusion
Lecture 4 - Introduction to Laplace transform
Lecture 5 - Tutorial 1
Lecture 6 - Laplace transformation of Fick's second law
Lecture 7 - Solutions to Diffusion equations - 1
Lecture 8 - Solutions to Diffusion equations - 2
Lecture 9 - Solutions to Diffusion equations - 3
Lecture 10 - Tutorial 2
Lecture 11 - Demo of Scilab: Plotting the diffusion profile
Lecture 12 - Revisiting structure and defects in crystalline solids - 1
Lecture 13 - Revisiting structure and defects in crystalline solids - 2
Lecture 14 - Random walk and atomic jumps
Lecture 15 - Tutorial 3
Lecture 16 - Atomic mechanisms of diffusion
Lecture 17 - Correlation factors - 1
Lecture 18 - Correlation factors - 2
Lecture 19 - Temperature and pressure dependence of diffusion
Lecture 20 - Tutorial 4
Lecture 21 - Revisiting G-X curves and phase diagrams
Lecture 22 - Basics of Interdiffusion
Lecture 23 - Phase Formation in Interdiffusion Zone
Lecture 24 - Composition profiles in interdiffusion zone - 1
Lecture 25 - Tutorial 5
Lecture 26 - Composition profiles in interdiffusion zone - 2
Lecture 27 - Boltzmann-Matano Analysis
Lecture 28 - Kirkendall Effect
Lecture 29 - Intrinsic diffusion and Darkens analysis

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- Lecture 30 - Tutorial 6
- Lecture 31 - Introduction to CALPHAD
- Lecture 32 - CALPHAD implementation software and diffusion module
- Lecture 33 - Thermodynamic and kinetic databases
- Lecture 34 - Moving boundary and multiphase diffusion simulations
- Lecture 35 - Tutorial 7
- Lecture 36 - Techniques to measure diffusion coefficients, Radiotracer diffusion, Deviations from Gaussian profile
- Lecture 37 - SIMS AND EPMA
- Lecture 38 - Mechanical spectroscopy and Electrical Methods
- Lecture 39 - Nuclear methods - 1
- Lecture 40 - Tutorial 8
- Lecture 41 - Nuclear Methods - 2
- Lecture 42 - Grain boundary structure and fisher model
- Lecture 43 - Kinetic regime of grain boundary diffusion
- Lecture 44 - Dislocation pipe diffusion
- Lecture 45 - Tutorial 9
- Lecture 46 - Diffusion in Intermetallics
- Lecture 47 - Diffusion in nanocrystalline materials
- Lecture 48 - Diffusion in quasicrystalline alloys
- Lecture 49 - Diffusion in metallic alloys - 1
- Lecture 50 - Tutorial 10
- Lecture 51 - Diffusion in metallic alloys - 2
- Lecture 52 - Diffusion in high entropy alloys
- Lecture 53 - Diffusion in semiconductors - 1
- Lecture 54 - Diffusion in semiconductors - 2
- Lecture 55 - Tutorial 11
- Lecture 56 - Diffusion in glasses
- Lecture 57 - Diffusion in ionic solids - 1
- Lecture 58 - Diffusion in ionic solids - 2
- Lecture 59 - Tutorial 12
- Lecture 60 - Revision of important concepts

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Computational Thermodynamics and Kinetics of Materials

Subject Co-ordinator - Prof. K. Guruvidyathri

Co-ordinating Institute - University of Hyderabad

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

Lecture 1 - Essential physical metallurgy concepts : Part 1 - Microstructure | Phase
Lecture 2 - Essential physical metallurgy concepts : Part 2 - Types of phases | Chemical order | Phase Equilibrium
Lecture 3 - Essential physical metallurgy concepts : Part 3 - Phase diagrams - Unary | Isomorphous
Lecture 4 - Essential physical metallurgy concepts : Part 4 - Phase diagram Information
Lecture 5 - Essential physical metallurgy concepts : Part 5 - Phase diagrams - Transformations
Lecture 6 - Essential physical metallurgy concepts : Part 6 - Ternary phase diagrams: isothermal sections
Lecture 7 - Essential physical metallurgy concepts : Part 7 - Phase diagrams: Extended and emergent phases, v
Lecture 8 - Essential physical metallurgy concepts : Part 8 - Phase diagrams: Reactions, Liquidus projections
Lecture 9 - Essential physical metallurgy concepts : Part 9 - Phase fraction plots, Mechanisms and Kinetics of
Lecture 10 - Experimental methods of phase diagram determination - Cooling curve method
Lecture 11 - Essential concepts of thermodynamics : Part 1 - Scope, State, State properties
Lecture 12 - Essential concepts of thermodynamics : Part 2 - Temperature, Heat capacity, Internal energy
Lecture 13 - Essential concepts of thermodynamics : Part 3 - The first law, Reversible and Irreversible processes
Lecture 14 - Essential concepts of thermodynamics : Part 4 - Isothermal and Adiabatic processes, Path quantities
Lecture 15 - Essential concepts of thermodynamics : Part 5 - Engine, Entropy, Clausius inequality, The second law
Lecture 16 - Essential concepts of thermodynamics : Part 6 - Statistical thermodynamics, Meaning of entropy
Lecture 17 - Essential concepts of thermodynamics : Part 7 - Types of Entropy, Combined laws, Enthalpy and Gibbs
Lecture 18 - Thermodynamics of Materials : Part 1 - Lattice stability, Enthalpy of mixing
Lecture 19 - Thermodynamics of Materials : Part 2 - Interaction Parameter, Entropy, Gibbs Energy and Chemical
Lecture 20 - Thermodynamics of Materials : Part 3 - Chemical potential | Activity | Solutions
Lecture 21 - Thermodynamics of Materials : Part 4 - G-x plots | Common tangent construction
Lecture 22 - Thermodynamics of Materials : Part 5 - G-x diagrams | G description
Lecture 23 - Thermodynamics of Materials : Part 6 - G-x curves | Driving force | T0 curve
Lecture 24 - Thermodynamics of Materials : Part 7 - G-x curves exercises | Gibbs phase rule
Lecture 25 - Computational Thermodynamics : Part 1 - Introduction, unary models and data
Lecture 26 - Computational Thermodynamics : Part 2 - Binary and higher order models, Minimization
Lecture 27 - Hands-on Thermodynamic Calculations : Part 1 - Software, Modes, Single point calculations
Lecture 28 - Hands-on Thermodynamic Calculations : Part 2 - Unary G vs T, Binary phase fraction plot
Lecture 29 - Hands-on Thermodynamic Calculations : Part 3 - Binary, Ternary and Metastable Phase Diagrams

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- Lecture 30 - Hands-on Thermodynamic Calculations : Part 4 - Ternary Vertical, Pseudo binary section, Console
- Lecture 31 - Hands-on Thermodynamic Calculations : Part 5 - Vertical sections
- Lecture 32 - Hands-on Thermodynamic Calculations : Part 6 - Quaternary and higher order diagrams
- Lecture 33 - Hands-on Thermodynamic Calculations : Part 7 - Property diagrams
- Lecture 34 - Hands-on Thermodynamic Calculations : Part 8 - T0 curve
- Lecture 35 - Hands-on Thermodynamic Calculations : Part 9 - Scheil solidification
- Lecture 36 - Thermodynamic assessment : Part 1 - Outline of the method, Input thermochemical data
- Lecture 37 - Thermodynamic assessment : Part 2 - Input thermochemical data
- Lecture 38 - Thermodynamic Assessment : Part 3 - Input phase equilibria data, non-isothermal methods
- Lecture 39 - Thermodynamic assessment : Part 4 - Input phase equilibria data, isothermal methods
- Lecture 40 - Thermodynamic assessment : Part 5 - Input data collection, critical evaluation
- Lecture 41 - Thermodynamic assessment : Part 6 - Models 1
- Lecture 42 - Thermodynamic assessment : Part 7 - Models 2
- Lecture 43 - Thermodynamic Assessment : Part 8 - Optimization guidelines
- Lecture 44 - Thermodynamic Assessment : Part 9 - Hands-on G Optimization
- Lecture 45 - Thermodynamic Assessment : Part 10 - Database compilation
- Lecture 46 - Kinetics of Materials : Part 1 - Diffusion, Fick's laws
- Lecture 47 - Kinetics of Materials : Part 2 - Phase equilibria and diffusion, Mobility
- Lecture 48 - Computational Thermokinetics: Introduction and mobility assessment
- Lecture 49 - Hands-on kinetic simulation : Part 1 - Homogenization
- Lecture 50 - Hands-on kinetic simulation : Part 2 - Moving phase boundary problems
- Lecture 51 - Hands on kinetic simulation : Part 3 - Diffusion couple, Non-isothermal diffusion
- Lecture 52 - Hands on kinetic simulation : Part 4 - Modified Scheil: Back diffusion, Solute trapping
- Lecture 53 - Essential concepts of overall kinetics - Nucleation, Growth
- Lecture 54 - Hands-on kinetic simulation : Part 5 - Overall kinetics, TTT
- Lecture 55 - Hands-on kinetic simulation : Part 6 - Precipitation aging
- Lecture 56 - Compositional design - High-throughput Calphad
- Lecture 57 - Insights from Calphad for alloy design and characterization
- Lecture 58 - Material properties in Calphad spirit
- Lecture 59 - Calphad - Size effects, Electrochemistry, Process metallurgy
- Lecture 60 - Calphad - Summary, history and future

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

- 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

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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NPTEL 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 Continuous Casting

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

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

- 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

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

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

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

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Materials Design for Electronic, Electromechanical

Subject Co-ordinator - Prof. Pavan Nukala

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Description of material properties
- Lecture 2 - Direct and Coupled properties
- Lecture 3 - Tensor algebra and property tensor
- Lecture 4 - Tensor algebra (Continued...)
- Lecture 5 - Property tensor: higher rank tensor and nonlinear property
- Lecture 6 - Property tensor (Continued...)
- Lecture 7 - Field tensor: Stress and strain
- Lecture 8 - Point symmetry operation: rotation and inversion
- Lecture 9 - Point symmetry operation: rotoinversion
- Lecture 10 - Point symmetry operation: examples in material system
- Lecture 11 - Crystal Systems, Bravais Lattices and Symmetry
- Lecture 12 - Crystal Systems, Bravais Lattices and Symmetry
- Lecture 13 - Crystal Systems, Bravais Lattices and Symmetry
- Lecture 14 - Crystal Systems, Bravais Lattices and Symmetry
- Lecture 15 - Crystal Systems, Bravais Lattices and Symmetry
- Lecture 16 - Development of point group - Part 1
- Lecture 17 - Development of point group - Part 2
- Lecture 18 - Development of point group - Part 3 : Some visualization in real crystals
- Lecture 19 - Point groups, polar groups and consequences in property
- Lecture 20 - Structure-symmetry- property correlation
- Lecture 21 - Ferroelectricity, polar point groups - I
- Lecture 22 - Ferroelectricity, polar point groups - II
- Lecture 23 - Space Groups - I
- Lecture 24 - Space Groups - II
- Lecture 25 - Visualizing Important Crystals (A space group perspective)
- Lecture 26 - Some more popular structures and their visualization
- Lecture 27 - Symmetry-property correlation - Part 1
- Lecture 28 - Symmetry-property correlation - Part 2
- Lecture 29 - Symmetry-property correlation - Part 3

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

- Lecture 30 - Thermodynamics and equilibrium properties - Part 1
- Lecture 31 - Thermodynamics and equilibrium properties - Part 2
- Lecture 32 - Thermodynamics and equilibrium properties - Part 3
- Lecture 33 - Thermodynamics and equilibrium properties - Part 4
- Lecture 34 - Statistical Mechanics
- Lecture 35 - Title Statistical Mechanics (Continued...)
- Lecture 36 - Properties as fluctuations and correlations of order parameter
- Lecture 37 - Properties as fluctuations and correlations (Continued...)
- Lecture 38 - Landau Theory and Phase Transitions
- Lecture 39 - Landau Theory and Phase Transitions (Continued...)
- Lecture 40 - Phase transitions and enhancement of fluctuations
- Lecture 41 - Dissipative properties
- Lecture 42 - Dissipative properties
- Lecture 43 - Dissipative properties: Onsagers linear response theory
- Lecture 44 - Onsagers linear response theory (Continued...)
- Lecture 45 - Onsagers theory: A few case studies
- Lecture 46 - Measurement of response function
- Lecture 47 - Small Signal Measurement
- Lecture 48 - Atomistic picture of Dielectric constant
- Lecture 49 - Relaxation vs Resonance
- Lecture 50 - Resonance
- Lecture 51 - Causality
- Lecture 52 - Kramers-Kronig relations
- Lecture 53 - Kramers-Kronig and Spectroscopy
- Lecture 54 - Spectroscopy at various time scale
- Lecture 55 - Spectroscopy (Continued...)
- Lecture 56 - Spectroscopy (Continued...)

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Advanced Manufacturing and Process Modelling

Subject Co-ordinator - Prof. Prosenjit Das

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction to Manufacturing science
Lecture 2 - Finite difference method and Finite volume method
Lecture 3 - Introduction to Finite Element Methods
Lecture 4 - Introduction to Finite Element Methods
Lecture 5 - Introduction to Boundary element methods
Lecture 6 - Introduction to casting and solidification
Lecture 7 - Solidification of metal and alloys
Lecture 8 - Introduction to casting
Lecture 9 - Introduction to casting
Lecture 10 - Introduction to casting
Lecture 11 - Introduction to casting and its types
Lecture 12 - Types of casting and defects
Lecture 13 - Introduction to die filling analysis
Lecture 14 - Porosity Modelling and Gravity die casting
Lecture 15 - Rheology
Lecture 16 - Case studies on Die filling
Lecture 17 - Introduction to welding
Lecture 18 - Principle of fusion welding
Lecture 19 - Principle of fusion welding
Lecture 20 - Welding Mechanics
Lecture 21 - Welding Mechanics, Types of welding
Lecture 22 - Types of welding
Lecture 23 - Types of welding
Lecture 24 - Types of welding
Lecture 25 - Types of welding
Lecture 26 - Procedure for numerical modelling
Lecture 27 - Procedure for solving governing equations
Lecture 28 - Procedure for solving governing equations
Lecture 29 - Solvers and Boundary conditions

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

- Lecture 30 - Transport phenomena during solidification (Continued...)
- Lecture 31 - Introduction to Powder Metallurgy
- Lecture 32 - Process methodology on Powder Metallurgy
- Lecture 33 - Process methodology on Powder Metallurgy
- Lecture 34 - Atomization and Sintering
- Lecture 35 - Theory of sintering
- Lecture 36 - Theory of sintering
- Lecture 37 - Different processes in powder metallurgy
- Lecture 38 - Design of the molding system
- Lecture 39 - Ceramic Injection Molding and metal injection molding
- Lecture 40 - Metal forming and process modelling
- Lecture 41 - Mechanics of metal working
- Lecture 42 - Mechanics of metal working
- Lecture 43 - Metal working processes
- Lecture 44 - Metal working processes
- Lecture 45 - Metal working processes
- Lecture 46 - Metal working processes
- Lecture 47 - Phase field Modelling
- Lecture 48 - Numerical Modelling for welding
- Lecture 49 - Introduction to Additive manufacturing
- Lecture 50 - Numerical Modelling of Additive manufacturing
- Lecture 51 - Phase field
- Lecture 52 - Transport phenomena, Process modelling of Metal forming, Machining

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Advances in Additive Manufacturing of Materials: C

Subject Co-ordinator - Prof. Bikramjit Basu

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Introduction to additive manufacturing
- Lecture 2 - Introduction and classification of AM processes
- Lecture 3 - Advantages of AM over Conventional Manufacturing
- Lecture 4 - Design aspects in 3D printing
- Lecture 5 - Introduction to Engineering Materials
- Lecture 6 - Properties of material classes
- Lecture 7 - Introduction to material characterization
- Lecture 8 - Introduction to mechanical property of materials
- Lecture 9 - Overview of AM Processes and Demonstration of industry-scale L-PBF machine
- Lecture 10 - Overview of AM Processes
- Lecture 11 - Binderjet 3D printing: Process Science
- Lecture 12 - Scientific Case study: Binderjet 3D printing of Ti6Al4V
- Lecture 13 - Scientific Case study: Binderjet 3D printing of Ti-6Al-4V with in situ polymerisable ink
- Lecture 14 - Scientific Case study: Binderjet 3D printing of Ti-6Al-4V with in situ polymerisable ink
- Lecture 15 - Scientific Case study: Zirconia based bioceramics: binderjet printing using the novel binder
- Lecture 16 - Scientific Case study: Binderjet 3D Printing of bioceramics
- Lecture 17 - Inkjet Cell Printing
- Lecture 18 - Process Science of Laser-based AM Process of metallic materials
- Lecture 19 - Microstructure development during Laser-based AM Process
- Lecture 20 - Introduction to Lattice Structures
- Lecture 21 - Introduction to Cellular structure and Topology Optimisation
- Lecture 22 - Scientific case study: SLM Printing of Ti6Al4V lattice structures and properties
- Lecture 23 - Scientific case study: SLM Printing of SS316L lattice structures and properties
- Lecture 24 - Labscale Demonstration of Directed Energy Deposition (DED)-printing of Materials
- Lecture 25 - Additive Manufacturing of Materials - Applications, solutions and Future Perspective
- Lecture 26 - Additive Manufacturing of Materials - Applications, solutions and Future Perspective
- Lecture 27 - Introduction to biological system
- Lecture 28 - Introduction to biological system
- Lecture 29 - Introduction to Biological System

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- Lecture 30 - Introduction to biological system
- Lecture 31 - Fundamentals of Rheology
- Lecture 32 - Process Science: 3D extrusion (Bio)printing/4D Bioprinting
- Lecture 33 - Process Science: 3D extrusion (Bio)printing/4D Bioprinting
- Lecture 34 - Scientific case study: 3D extrusion printing of Alginate-Gelatin hydrogels
- Lecture 35 - 3D extrusion printing of Gelatin glycidyl methacrylate/alginate/nanocellulose-based hydrogel
- Lecture 36 - Scientific case study-3D extrusion bioprinting of GelMA hydrogels for hard tissue
- Lecture 37 - 3D extrusion (Bio)printing of GelMA hydrogels for hard tissue
- Lecture 38 - 3D (Bio)printing of GelMA hydrogels for neural tissue regeneration
- Lecture 39 - 3D (Bio)printing of GelMA hydrogels for neural tissue regeneration
- Lecture 40 - Labscale demonstration of 3D extrusion printing of hydrogels
- Lecture 41 - 3D printing of cranium models mediated bone flaps for patient-specific Cranioplasty surgery
- Lecture 42 - 3D printing of cranium models mediated bone flaps for patient-specific Cranioplasty surgery
- Lecture 43 - 3D printing of Ceramic Dental implants
- Lecture 44 - 3D printing of Ceramic Dental implants
- Lecture 45 - Emerging topics in AM - Introduction to artificial intelligence and machine learning
- Lecture 46 - Emerging topics in AM - Introduction to artificial intelligence and machine learning
- Lecture 47 - Emerging topics in AM - Introduction to artificial intelligence and machine learning
- Lecture 48 - Scientific case study - DED of SS316L melt pool prediction using machine learning
- Lecture 49 - Scientific case study - AI/ML for regression and Classification analysis in DED 3D printing
- Lecture 50 - Challenges and opportunities in Additive Manufacturing
- Lecture 51 - Challenges and opportunities in Additive Manufacturing
- Lecture 52 - Challenges and opportunities in Additive Manufacturing
- Lecture 53 - Challenges and opportunities in Additive Manufacturing
- Lecture 54 - Challenges and opportunities in Additive Manufacturing
- Lecture 55 - Challenges and opportunities in Additive Manufacturing
- Lecture 56 - Challenges and opportunities in Additive Manufacturing
- Lecture 57 - Emerging opportunity: Bioprinting in Space
- Lecture 58 - Emerging opportunity: Bioprinting in Space
- Lecture 59 - Summary of key concepts in AM
- Lecture 60 - Summary of Emerging topics and challenges in AM

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

NPTEL Video Course - Metallurgy and Material Science - NOC:Advanced Material Characterization by Atom Probe T

Subject Co-ordinator - Prof. Surendra Kumar Makineni

Co-ordinating Institute - IISc Bangalore

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

- Lecture 1 - Introduction to the course
- Lecture 2 - History from electrons to field ionisation to field evaporation
- Lecture 3 - Filed Ion Microscopy
- Lecture 4 - Basic physics behind Field Ionisation
- Lecture 5 - Field Ion Microscopy Instrumentation
- Lecture 6 - Field Ionisation to Field Evaporation
- Lecture 7 - Field Desorption Microscopy
- Lecture 8 - Atom Probe Tomography: Variables
- Lecture 9 - Instrumentation
- Lecture 10 - Pulsing methods
- Lecture 11 - Photon-assisted Ionisation
- Lecture 12 - Experimental protocols for APT
- Lecture 13 - Experimental protocols for APT
- Lecture 14 - Experimental protocols for APT
- Lecture 15 - Tomographic Reconstruction
- Lecture 16 - Tomographic Reconstruction
- Lecture 17 - Tomographic Reconstruction
- Lecture 18 - Calibration of reconstruction
- Lecture 19 - Common artifacts in reconstruction
- Lecture 20 - Spatial resolution in reconstruction
- Lecture 21 - Electropolishing
- Lecture 22 - Focused Ion Beam (FIB)
- Lecture 23 - Focused Ion Beam (FIB)
- Lecture 24 - Focused Ion Beam (FIB)
- Lecture 25 - Data analysis
- Lecture 26 - Quality of data
- Lecture 27 - Mounting of specimens
- Lecture 28 - Ion milling of specimens
- Lecture 29 - Data analysis

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Lecture 30 - Specimen loading
Lecture 31 - Data acquisition
Lecture 32 - Data analysis
Lecture 33 - Basics
Lecture 34 - Basics
Lecture 35 - Basics
Lecture 36 - Electron specimen interaction
Lecture 37 - TEM column cross-section
Lecture 38 - Electron Diffraction
Lecture 39 - Diffraction Patterns
Lecture 40 - Imaging
Lecture 41 - Defect analysis
Lecture 42 - Image Formation
Lecture 43 - Detection of electrons and ECCI
Lecture 44 - Application to Materials Science
Lecture 45 - Application to Materials Science
Lecture 46 - Application to Materials Science