

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

Lecture 30 - Module 5
Lecture 31 - Module 5
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Lecture 87 - Module 22

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

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

Subject Co-ordinator - Prof. Swarup bag

Co-ordinating Institute - IIT - Guwahati

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

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

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

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

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

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Advanced Characterization Techniques
Lecture 2 - Advanced Characterization Techniques
Lecture 3 - Advanced Characterization Techniques
Lecture 4 - Advanced Characterization Techniques
Lecture 5 - Advanced Characterization Techniques
Lecture 6 - Advanced Characterization Techniques
Lecture 7 - Advanced Characterization Techniques
Lecture 8 - Advanced Characterization Techniques
Lecture 9 - Advanced Characterization Techniques
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Lecture 29 - Advanced Characterization Techniques

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

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

NPTEL Video Course - Metallurgy and Material Science - Electroceramics

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

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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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- 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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- 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

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

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

Subject Co-ordinator - Dr. Anandh Subramaniam

Co-ordinating Institute - IIT - Kanpur

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

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

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

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

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

Subject Co-ordinator - Dr. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction, Basic definition of corrosion

Lecture 2 - Forms of Degradation, Thermodynamics of corrosion

Lecture 3 - Thermodynamics of corrosion

Lecture 4 - Thermodynamics of corrosion

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

Lecture 6 - Reduction Potential series, Pourbaix diagram

Lecture 7 - Pourbaix diagram

Lecture 8 - Pourbaix diagram

Lecture 9 - Pourbaix diagram, Kinetics of corrosion

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

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

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

Lecture 13 - Activation Polarization, Concentration Polarization

Lecture 14 - Concentration Polarization, Mixed Potential Theory

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

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

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

Lecture 18 - Passivation and Mixed potential theory

Lecture 19 - Passivation and Mixed potential theory

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

Lecture 21 - Cathodic and anodic protection

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

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

Lecture 24 - Galvanic corrosion

Lecture 25 - Crevice corrosion

Lecture 26 - Crevice corrosion, Pitting corrosion

Lecture 27 - Pitting corrosion, Intergranular corrosion

Lecture 28 - Intergranular corrosion, Dealloying

Lecture 29 - Dealloying, Erosion corrosion

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

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

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

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

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

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

Co-ordinating Institute - Central Glass and Ceramic Research Institute

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

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

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

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

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

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

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

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

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

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

- 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 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

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

Subject Co-ordinator - Prof. Parasuraman S

Co-ordinating Institute - IIT - Madras

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

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

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

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

Subject Co-ordinator - Dr. Prathap Haridoss

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Reciprocal space; Definition and Properties

Lecture 2 - Condition for Diffraction

Lecture 3 - Worked out examples

Lecture 4 - Ewald Sphere and lattices in reciprocal space

Lecture 5 - Wigner Sietz cells and Brillouin Zones

Lecture 6 - Worked out exmaples

Lecture 7 - Brillouin Zones, Diffraction and allowed energy levels

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

Lecture 9 - Week 3 Worked out examples

Lecture 10 - Reciprocal space as Fourier transform of real lattice

Lecture 11 - Alternate notation of reciprocal space

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

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

Subject Co-ordinator - Dr. G. Phanikumar

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to fusion welding processes

Lecture 2 - Introduction to fusion welding processes

Lecture 3 - Heat sources - Part 1/2

Lecture 4 - Heat sources - Part 2/2

Lecture 5 - Heat removal

Lecture 6 - Thermal Modelling - Part 1/2

Lecture 7 - Thermal Modelling - Part 2/2

Lecture 8 - Zones in a weldment

Lecture 9 - Analytical Solutions to Weld Thermal Field

Lecture 10 - Conduction to Keyhole mode

Lecture 11 - Fluid flow modelling - Part 1/2

Lecture 12 - Fluid flow modelling - Part 2/2

Lecture 13 - Solute transfer modelling - Part 1/2

Lecture 14 - Solute transfer modelling - Part 2/2

Lecture 15 - Solute segregation profile - Part 1/2

Lecture 16 - Solute segregation profile - Part 2/2

Lecture 17 - Microstructure Formation in Fusion Welds

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

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

Lecture 20 - Dissimilar Welding

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

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

Subject Co-ordinator - Prof. Bikramjit Basu

Co-ordinating Institute - IISc - Bangalore

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

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

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