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

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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

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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

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NPTEL Video Course - Metallurgy and Material Science - Electroceramics

Subject Co-ordinator - Dr. Ashish Garg

Co-ordinating Institute - IIT - Kanpur

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

Subject Co-ordinator - Prof. Satish Ch. Koria

Co-ordinating Institute - IIT - Kanpur

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

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Lecture 32 - Steady Heat flows in Furnace and Heat Exchanger
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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

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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

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

Subject Co-ordinator - Prof. Satish Ch. Koria

Co-ordinating Institute - IIT - Kanpur

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

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

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NPTEL Video Course - Metallurgy and Material Science - Steel Making

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

Co-ordinating Institute - IIT - Kanpur

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

Subject Co-ordinator - Dr. Anandh Subramaniam

Co-ordinating Institute - IIT - Kanpur

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Lecture 31 - Diffusion in Solids
Lecture 32 - Phase Diagrams
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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

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

Subject Co-ordinator - Dr. Kallol Mondal

Co-ordinating Institute - IIT - Kanpur

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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

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

Subject Co-ordinator - Dr. Krishanu Biswas

Co-ordinating Institute - IIT - Kanpur

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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

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

Subject Co-ordinator - Prof. Shashank Shekhar

Co-ordinating Institute - IIT - Kanpur

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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

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Lecture 31 - Diffusion controlled growth
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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

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

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

Co-ordinating Institute - Central Glass and Ceramic Research Institute

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

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

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

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

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

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

Co-ordinating Institute - IIT - Kharagpur

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

Subject Co-ordinator - Dr. Pallab Banerji

Co-ordinating Institute - IIT - Kharagpur

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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

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

Subject Co-ordinator - Prof. B. Adhikari

Co-ordinating Institute - IIT - Kharagpur

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

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

Co-ordinating Institute - IIT - Kharagpur

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

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

Co-ordinating Institute - IIT - Madras

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

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NPTEL Video Course - Metallurgy and Material Science - Materials Characterization

Subject Co-ordinator - Dr. S. Sankaran

Co-ordinating Institute - IIT - Madras

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Lecture 30 - Profile fit, Factors affecting peak brodening
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 - Fundementals 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

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

Subject Co-ordinator - Dr. Prathap Haridoss

Co-ordinating Institute - IIT - Madras

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

Subject Co-ordinator - Prof. Parasuraman S

Co-ordinating Institute - IIT - Madras

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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

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

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

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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 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

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

Subject Co-ordinator - Dr. G. Phanikumar

Co-ordinating Institute - IIT - Madras

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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

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

Subject Co-ordinator - Prof. Bikramjit Basu

Co-ordinating Institute - IISc - Bangalore

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Lecture 30 - Polymers manufacturing
Lecture 31 - Additive manufacturing
Lecture 32 - HA-Ti-Toughness, Cell functionality
Lecture 33 - HA-CaTiO 3 development
Lecture 34 - HA- BaTiO 3 Functional Prop
Lecture 35 - HA-Ag antimicrob and cell viability
Lecture 36 - HA-ZnO, Cell fate and antimicrobial
Lecture 37 - Dental ceramics processing
Lecture 38 - Sr-based glass Ceramics
Lecture 39 - Acetabular socket (Compression mold)
Lecture 40 - ZTA femoral ball head fabrication

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