

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Organo Metallic Chemistry

Subject Co-ordinator - Prof.Debabrata Maiti

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction of Organometallic Chemistry

Lecture 2 - Counting of Electrons

Lecture 3 - Ligand Substitution Reactions

Lecture 4 - Oxidative Addition [1. Concerted Mechanism]

Lecture 5 - Oxidative Addition [2. SN2 Mechanism]

Lecture 6 - Oxidative Addition [3. Radical Mechanism]

Lecture 7 - Reductive Elimination

Lecture 8 - Migratory Insertion and Elimination Reactions

Lecture 9 - Migration and Insertion Reactions

Lecture 10 - Alpha-Migratory Insertion and alpha-Elimination Reactions

Lecture 11 - Beta-Migratory Insertion

Lecture 12 - Beta-Elimination Reaction

Lecture 13 - Alpha-Abstraction and beta-Abstraction

Lecture 14 - 4-Center Reactions; [2+2] Reactions

Lecture 15 - External Attack by a Ligand and Reductive Coupling

Lecture 16 - Hydrogenation Reaction

Lecture 17 - Hydrogenation Reaction [Dihydride Catalyst]

Lecture 18 - Stereoselective Hydrogenation Reaction

Lecture 19 - Carbonylation Reaction [1. Monsanto Acetic Acid Process 2. Hydroformylation 3. Hydrocarboxylation]

Lecture 20 - Carbonylation Reaction [1. Hydroformylation 2. Hydrocarboxylation 3. Hydrocyanation]

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemical and Biological Thermodynamics: Principles to A

Subject Co-ordinator - Prof. Nand Kishore

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Fundamentals of Chemical thermodynamics
- Lecture 2 - Work
- Lecture 3 - Tutorial-1
- Lecture 4 - First Law of Thermodynamics
- Lecture 5 - Tutorial-2
- Lecture 6 - Adiabatic processes
- Lecture 7 - Entropy
- Lecture 8 - Entropy and Second Law
- Lecture 9 - Entropy and Second Law
- Lecture 10 - Third Law of Thermodynamics
- Lecture 11 - Discussion on Helmholtz energy
- Lecture 12 - Discussion on Gibbs Energy
- Lecture 13 - Maxwell relations, Properties of Gibbs energy
- Lecture 14 - Further discussion on properties of Gibbs energy
- Lecture 15 - Fugacity
- Lecture 16 - Tutorial session
- Lecture 17 - Tutorial session
- Lecture 18 - Chemical potential of a substance in mixture
- Lecture 19 - Chemical potential of Liquids, Raoult's Law, Henry's Law
- Lecture 20 - Thermodynamics of mixing, Excess functions
- Lecture 21 - Partial molar volume
- Lecture 22 - Activities (Accounting for deviations from Ideal behaviour)
- Lecture 23 - Tutorial on thermodynamics of mixing and deviations from ideality
- Lecture 24 - Further discussion on relation between C_p and C_v
- Lecture 25 - Chemical Equilibrium
- Lecture 26 - Perfect gas equilibria
- Lecture 27 - Equilibrium constant
- Lecture 28 - Effect of pressure on equilibrium constant and equilibrium composition
- Lecture 29 - Effect of temperature on equilibria

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- Lecture 30 - Biological standard states and pH
- Lecture 31 - Tutorial 1 - Equilibrium constant
- Lecture 32 - Tutorial 2 - Equilibrium constant
- Lecture 33 - Acids and bases and Equilibrium concepts
- Lecture 34 - pH Scale Strong and weak acids and bases
- Lecture 35 - Strong and weak acids and bases
- Lecture 36 - Acid-base titrations
- Lecture 37 - pH curve for titration of weak acid with strong base Buffers and indicators
- Lecture 38 - Thermodynamics in systems of biological interest
- Lecture 39 - Calorimetry
- Lecture 40 - Differential scanning calorimetry (DSC)
- Lecture 41 - Further discussion on Differential Scanning Calorimetry (DSC)
- Lecture 42 - Explaining Differential Scanning Calorimetric Profiles (DSC Profiles)
- Lecture 43 - Applications of DSC in thermal unfolding of proteins and protein-solvent interactions
- Lecture 44 - Further discussion on applications of DSC in thermal unfolding of proteins and protein-solvent i
- Lecture 45 - Isothermal Titration calorimetry (ITC)
- Lecture 46 - Further discussion on Isothermal Titration calorimetry (ITC)
- Lecture 47 - ITC Experimental Design and Isothermal Titration Calorimetry (ITC) in Drug Design
- Lecture 48 - Isothermal Titration Calorimetry (ITC) in Drug Design
- Lecture 49 - Isothermal Titration Calorimetry (ITC) in Engineering Binding Affinity
- Lecture 50 - Calorimetry in identifying partially folded states of proteins (Molten Globule State)
- Lecture 51 - Thermodynamic Characterization of Partially Folded States of Proteins
- Lecture 52 - Quantitative Thermodynamic Characterization of Partially Folded States of Proteins
- Lecture 53 - ITC in Drug-Protein Interactions
- Lecture 54 - Identifying sites for Drug-Protein Interactions by ITC
- Lecture 55 - Identifying sites for Drug-Protein Interactions, DSC of Protein-Ligand Complexes. Enthalpy-Entro
- Lecture 56 - Estimation of Binding Constants in Strong to Ultratight Protein-Ligand, Interactions Using Diffe
- Lecture 57 - Continuation of discussion on... Estimation of Binding Constants in Strong to UltratightProtein-
- Lecture 58 - Thermal unfolding of protein by non-calorimetric methods, Addressing thermodynamics of the proce
- Lecture 59 - Titration Calorimetry as a tool to determine thermodynamic and Kinetic parameters of enzymes
- Lecture 60 - Summary of the course on

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemistry of Main Group Elements

Subject Co-ordinator - Prof. M. S. Balakrishna

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Classification of Elements and Periodic Properties
- Lecture 2 - Periodic Properties, Periodic Trends and Classification of Main Group Compounds
- Lecture 3 - Classification of Main Group Compounds
- Lecture 4 - Effective Nuclear Charge
- Lecture 5 - Structure and Bonding Aspects
- Lecture 6 - Structure and Bonding Aspects
- Lecture 7 - Structure and Bonding Aspects
- Lecture 8 - Structure and Bonding Aspects
- Lecture 9 - Structure and Bonding Aspects
- Lecture 10 - Structure and Bonding Aspects
- Lecture 11 - Structure and Bonding Aspects
- Lecture 12 - Structure and Bonding Aspects
- Lecture 13 - Chemistry of Hydrogen
- Lecture 14 - Chemistry of Hydrogen
- Lecture 15 - Chemistry of Hydrogen, Hydrides and Hydrogen Bonding
- Lecture 16 - Chemistry of Group 1 Elements
- Lecture 17 - Chemistry of Group 1 Elements
- Lecture 18 - Chemistry of Group 1 Elements
- Lecture 19 - Chemistry of Group 1 Elements
- Lecture 20 - Chemistry of Group 2 Elements
- Lecture 21 - Chemistry of Group 2 Elements
- Lecture 22 - Chemistry of Group 2 Elements
- Lecture 23 - Chemistry of Group 2 Elements
- Lecture 24 - Chemistry of Group 2 Elements
- Lecture 25 - Chemistry of Group 13 Elements
- Lecture 26 - Chemistry of Group 13 Elements
- Lecture 27 - Chemistry of Group 13 Elements
- Lecture 28 - Chemistry of Group 13 Elements
- Lecture 29 - Chemistry of Group 13 Elements

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- Lecture 30 - Wades Rules
- Lecture 31 - Chemistry of Group 13 Elements
- Lecture 32 - Chemistry of Group 14 Elements
- Lecture 33 - Chemistry of Group 14 Elements
- Lecture 34 - Chemistry of Group 14 Elements
- Lecture 35 - Chemistry of Group 14 Elements
- Lecture 36 - Chemistry of Group 14 Elements
- Lecture 37 - Chemistry of Group 14 Elements
- Lecture 38 - Chemistry of Group 14 Elements
- Lecture 39 - Chemistry of Group 15 Elements
- Lecture 40 - Chemistry of Group 15 Elements
- Lecture 41 - Chemistry of Group 15 Elements
- Lecture 42 - Chemistry of Group 15 Elements
- Lecture 43 - Chemistry of Group 15 Elements
- Lecture 44 - Chemistry of Group 15 Elements
- Lecture 45 - Chemistry of Group 15 Elements
- Lecture 46 - Chemistry of Group 15 Elements
- Lecture 47 - Chemistry of Group 16 Elements
- Lecture 48 - Chemistry of Group 16 Elements
- Lecture 49 - Chemistry of Group 16 Elements
- Lecture 50 - Chemistry of Group 16 Elements
- Lecture 51 - Chemistry of Group 16 Elements
- Lecture 52 - Chemistry of Group 17 Elements
- Lecture 53 - Chemistry of Group 17 Elements
- Lecture 54 - Chemistry of Group 18 Elements
- Lecture 55 - Chemistry of Group 12 Elements
- Lecture 56 - Organometallic Compounds of Main Group Elements
- Lecture 57 - Organometallic Compounds of Main Group Elements
- Lecture 58 - Organometallic Compounds of Main Group Elements
- Lecture 59 - Organometallic Compounds of Main Group Elements
- Lecture 60 - Overall Summary

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Transition Metal Organometallic Chemistry - Principles

Subject Co-ordinator - Prof. P. Ghosh

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - History of Organometallic Compounds
- Lecture 2 - Polarity and Reactivity of M-C bonds
- Lecture 3 - Reactivity of Organometallic Compounds
- Lecture 4 - Reactivity of Organometallic Compounds
- Lecture 5 - 18 Valence Electron Rule and Classification
- Lecture 6 - 18 Valence Electron Rule and Classification
- Lecture 7 - Reactivity and types of Organometallic compounds
- Lecture 8 - Sigma-Donor Ligands
- Lecture 9 - Preparation of Sigma-Alkyl Compounds
- Lecture 10 - Preparation and Properties of Sigma-Alkyl Compounds
- Lecture 11 - Properties of Sigma-Alkyl Compounds
- Lecture 12 - β elimination in Sigma-Alkyl Compounds
- Lecture 13 - β elimination in Detail
- Lecture 14 - TM Sigma-Alkyl Complexes and its Application
- Lecture 15 - TM Sigma-Alkyl Complexes and its Application
- Lecture 16 - C-H Activation
- Lecture 17 - C-H Activation in Details
- Lecture 18 - C-H Activation in Details
- Lecture 19 - Characterization of C-H Activation
- Lecture 20 - Bonding in C-H Activation
- Lecture 21 - C-C Bond Activation
- Lecture 22 - C-C Bond Activation
- Lecture 23 - C-C Bond Activation in Details
- Lecture 24 - Transition Metal Perfluoroalkyl (R_nF_{3-n}) Complexes
- Lecture 25 - Preparation of Transition Metal Perfluoroalkyl (R_nF_{3-n}) Complexes
- Lecture 26 - C-F Activation
- Lecture 27 - Transition Metal Alkenyl/Aryl Complexes
- Lecture 28 - Transition Metal Aryl Complexes
- Lecture 29 - Transition Metal Aryl/Alkyne Complexes

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- Lecture 30 - Transition Metal Alkyne/Carbene Complexes
- Lecture 31 - Transition Metal Carbene Complexes
- Lecture 32 - Transition Metal Carbene Complexes
- Lecture 33 - Transition Metal Carbene Complexes
- Lecture 34 - Transition Metal Carbene Complexes
- Lecture 35 - Transition Metal Carbene Complexes
- Lecture 36 - Transition Metal Carbene Complexes
- Lecture 37 - Reactivity of Schrock type Carbene Complexes and Transition Metal Carbynes
- Lecture 38 - Transition Metal Carbynes
- Lecture 39 - Transition Metal Carbynes
- Lecture 40 - Transition Metal Carbynes
- Lecture 41 - Properties of Transition Metal Carbynes And Transition Metal Carbonyls
- Lecture 42 - Transition Metal Carbonyls
- Lecture 43 - Transition Metal Carbonyls
- Lecture 44 - Transition Metal Carbonyls
- Lecture 45 - Transition Metal Carbonyls
- Lecture 46 - Transition Metal Carbonyls
- Lecture 47 - Transition Metal Carbonyls
- Lecture 48 - Transition Metal Carbonyl Hydrides
- Lecture 49 - Application of Carbonyl Metallates and Metal Halides
- Lecture 50 - Application of Metal Halides and Metal Alkenes
- Lecture 51 - Transition Metal Olefin Complexes
- Lecture 52 - Transition Metal Olefin Complexes
- Lecture 53 - Transition Metal Olefin Complexes
- Lecture 54 - Bonding Properties in Olefin Complexes
- Lecture 55 - Transition Metal Diolefin Complexes
- Lecture 56 - Transition Metal Diolefin and Alkyne Complexes
- Lecture 57 - Transition Metal Alkyne Complexes
- Lecture 58 - Transition Metal Alkyne Complexes
- Lecture 59 - Transition Metal Alkyne Complexes
- Lecture 60 - Summary

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NPTEL Video Course - Chemistry and Biochemistry - NOC: Metal Mediated Synthesis-I

Subject Co-ordinator - Prof. Debabrata Maiti

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Asymmetric Hydrogenation

Lecture 2 - Transition Metal Carbenes Fischer and Schrock Carbenes

Lecture 3 - Olefin Metathesis

Lecture 4 - Alkyne Metathesis

Lecture 5 - Cyclopropanation Reaction

Lecture 6 - Catalytic Cyclopropanation Reaction and Introduction to Cross Coupling Reaction

Lecture 7 - Kumada Coupling Reaction

Lecture 8 - Suzuki Coupling Reaction

Lecture 9 - Stille Coupling Reaction

Lecture 10 - Asymmetric Suzuki Coupling Reaction

Lecture 11 - Sonogashira Coupling Reaction

Lecture 12 - Heck Coupling Reaction

Lecture 13 - Asymmetric Heck Reaction Introduction to Buchwald-Hartwig Coupling Reaction

Lecture 14 - Buchwald-Hartwig Coupling Reaction

Lecture 15 - Role of Ligands its Influence in Buchwald-Hartwig Coupling Reaction

Lecture 16 - Oxidative Cyclization Process

Lecture 17 - Application of Oxidative Cyclization in Natural Product Synthesis

Lecture 18 - Synthesis of Reactive Metallacycle Intermediate Via-Beta-Abstraction and their Applications

Lecture 19 - Kulinkovich Reaction and its Mechanism

Lecture 20 - Pauson-Khand Reaction

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Inorganic Chemistry of Life: Principles and Perspective

Subject Co-ordinator - Prof. C.P. Rao

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Overview of inorganic chemistry of life
- Lecture 2 - Elements in biology and or life
- Lecture 3 - Selection and criteria for elements
- Lecture 4 - Biomolecules
- Lecture 5 - Coordination in enzymes
- Lecture 6 - Amino acids, peptides and proteins - An introduction
- Lecture 7 - Nucleoside, nucleotide and nucleic acids and DNA
- Lecture 8 - General introduction of metalloproteins
- Lecture 9 - Coordination chemistry aspects - An introduction
- Lecture 10 - Stability and lability
- Lecture 11 - Techniques used inorganic chemistry life
- Lecture 12 - Techniques used inorganic chemistry life (Continued...)
- Lecture 13 - Techniques used inorganic chemistry life (Continued...)
- Lecture 14 - Techniques used inorganic chemistry life (Continued...)
- Lecture 15 - Recap on metalloenzymes
- Lecture 16 - Role of Alkali, Alkaline earth elements in life
- Lecture 17 - Role of Alkali, Alkaline earth elements in life (Continued...)
- Lecture 18 - Role of Alkali, Alkaline earth elements in life (Continued...) Ion transport and ionophores
- Lecture 19 - Role of Alkali, Alkaline earth elements in life (Continued...) Ion transport and ionophores
- Lecture 20 - Functioning of ATPases and nucleases [Na,K]ATPase
- Lecture 21 - Role of vanadium in life - General perspectives
- Lecture 22 - Role of vanadium in life - Haloperoxidases
- Lecture 23 - Enzymes based on manganese in life
- Lecture 24 - Role of Iron in life - General perspectives
- Lecture 25 - Role of Iron in life - Transport systems
- Lecture 26 - Role of Iron in life - Transport and Storage systems
- Lecture 27 - Role of Iron in life - Electron transfer
- Lecture 28 - Role of Iron in life - Perspectives of electron transfer proteins
- Lecture 29 - Role of Iron in life - Monooxygenases

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- Lecture 30 - Role of Iron in life - Mono-and di-oxygenases
- Lecture 31 - Role of Iron in life - Reductases
- Lecture 32 - Role of Iron in life - Reductases and Phosphatases
- Lecture 33 - Role of Iron in life - Reductases and Phosphatases (Continued...)
- Lecture 34 - Role of Cobalt in life
- Lecture 35 - Role of Nickel in life - General perspectives
- Lecture 36 - Role of Nickel in life - Hydrolase, hydrogenase and SOD
- Lecture 37 - Role of Nickel in life - Carbonmonoxide dehydrogenase (CODH)
- Lecture 38 - Role of Copper in life - General perspectives
- Lecture 39 - Role of Copper in life - Type I and Type 2 copper enzymes
- Lecture 40 - Role of Copper in life - Multicenter copper oxidases and SOD
- Lecture 41 - Role of Zinc in life - General perspectives including oxidoreductases and hydrolases
- Lecture 42 - Role of Zinc in life - Carbonic anhydrase and carboxypeptidase
- Lecture 43 - Role of Zinc in life - Transferases, ligases and isomerases
- Lecture 44 - Role of Molybdenum in life - Introductory aspects
- Lecture 45 - Role of Molybdenum in life - Nitrogenase
- Lecture 46 - Role of Molybdenum in life - Oxidoreductases
- Lecture 47 - Role of Mercury in the environment - Mercury reductase
- Lecture 48 - Role of Selenium in life - Glutathione peroxidase
- Lecture 49 - Inorganics in medicine - Introductory aspects and cis-platin
- Lecture 50 - Inorganics in medicine - Apoptosis
- Lecture 51 - Inorganics in medicine - PDT, MRI and Barium tests
- Lecture 52 - Inorganics in medicine - Titanium in biomedical
- Lecture 53 - Highlights of the course - Part I
- Lecture 54 - Highlights of the course - Part II
- Lecture 55 - Highlights of the course - Part III
- Lecture 56 - Highlights of the course - Part IV
- Lecture 57 - Tutorials - Part I
- Lecture 58 - Tutorials - Part II
- Lecture 59 - Tutorials - Part III
- Lecture 60 - Tutorials - Part IV and overall

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Symmetry and Group Theory

Subject Co-ordinator - Prof. Anindya Datta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Symmetry point group
Lecture 2 - Symmetry point group
Lecture 3 - Symmetry point group
Lecture 4 - Symmetry point group
Lecture 5 - Symmetry point group
Lecture 6 - Transformation matrices and Matrix representation
Lecture 7 - More on Matrix representation
Lecture 8 - Matrix representation
Lecture 9 - Introduction to Group Theory
Lecture 10 - Group Multiplication Tables
Lecture 11 - Groups and subgroups
Lecture 12 - Classes, Similarity transformations
Lecture 13 - Introduction to Matrices
Lecture 14 - Application of matrices in solution of simultaneous equations
Lecture 15 - Matrix eigenvalue equation
Lecture 16 - Matrix eigenvalue equation
Lecture 17 - Similarity Transformations
Lecture 18 - Back to transformation matrices
Lecture 19 - Matrix representation revisited
Lecture 20 - Function space and Transformation Operators
Lecture 21 - Transformation Operators form the same group as transformation matrices
Lecture 22 - Transformation Operators form a unitary representation for orthonormal basis
Lecture 23 - Transformation Operators
Lecture 24 - Equivalent representations
Lecture 25 - Unitary Transformation
Lecture 26 - Unitary Transformations (Continued...)
Lecture 27 - Reducible and Irreducible Representations
Lecture 28 - Irreducible Representations and Great Orthogonality Theorem
Lecture 29 - Character Tables

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- Lecture 30 - Character Tables
- Lecture 31 - Practice Session
- Lecture 32 - Reducible to Irreducible Representations
- Lecture 33 - Character Tables of Cyclic Groups
- Lecture 34 - Symmetry of Normal Modes
- Lecture 35 - Symmetry of Normal Modes
- Lecture 36 - Symmetry of Normal Modes
- Lecture 37 - Recap
- Lecture 38 - Contribution of internal motion to normal modes
- Lecture 39 - Normal mode analysis
- Lecture 40 - Infrared and Raman spectroscopy
- Lecture 41 - IR and Raman activity
- Lecture 42 - IR and Raman activity
- Lecture 43 - Symmetry Adapted Linear Combinations (SALC)
- Lecture 44 - SALC
- Lecture 45 - SALC
- Lecture 46 - SALC
- Lecture 47 - Projection Operators
- Lecture 48 - Projection Operators (Continued...)
- Lecture 49 - Generating SALCs using Projection Operators
- Lecture 50 - Generating SALCs using Projection Operators (Continued...)
- Lecture 51 - Oh complex and Group-subgroup relation
- Lecture 52 - Group-Subgroup Relation
- Lecture 53 - SALCs as Pi-MO and Cyclopropenyl group
- Lecture 54 - SALCs as Pi-MO, Cyclopropenyl group
- Lecture 55 - SALCs as Pi-MO, Benzene
- Lecture 56 - LCAO Huckel approximation
- Lecture 57 - Huckel approximation
- Lecture 58 - Stationary states, Multiplicity, Ethylene
- Lecture 59 - Napthalene - I
- Lecture 60 - Napthalene - II
- Lecture 61 - Napthalene - III
- Lecture 62 - Transition Metal Complexes
- Lecture 63 - Jahn-Teller Theorem, Tetragonal Distortion MOT
- Lecture 64 - MOT approach of bonding, H₂O, Ferrocene
- Lecture 65 - MOT approach of bonding, H₂O, Ferrocene
- Lecture 66 - Derivation
- Lecture 67 - Derivation
- Lecture 68 - Derivation

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Computational Chemistry and Classical Molecular Dynamics

Subject Co-ordinator - Prof. B.L. Tembe

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Introduction to Computational Chemistry
- Lecture 2 - Writing Simple Programs
- Lecture 3 - Programming Techniques 1 - Evaluating the sine function
- Lecture 4 - Programming Techniques 2 - Do loops and if statements
- Lecture 5 - Programming Techniques 3 - Roots of a quadratic equation and arrays
- Lecture 6 - Programming Techniques 4 - Arrays and matrices
- Lecture 7 - Practical Session of Programming 1
- Lecture 8 - Programming Techniques 5 - Formats, Functions and Subroutines
- Lecture 9 - Programming Techniques 6 - Functions and Subroutines, arranging numbers in as ascending order
- Lecture 10 - Programming Techniques 7 - Functions and Subroutines, and the common statement
- Lecture 11 - Numerical Methods. Analysis of errors
- Lecture 12 - Practical Session on Programming 2 - The exponential function
- Lecture 13 - Practical Session on Programming 3 - Functions and Subroutines
- Lecture 14 - Interpolation Methods-1
- Lecture 15 - Interpolation Methods-2
- Lecture 16 - Errors in interpolation, Matrix operations
- Lecture 17 - Gauss elimination method for matrix inversion
- Lecture 18 - Matrix diagonalization, Similarity transformations
- Lecture 19 - Matrix inversion, Matrix diagonalization
- Lecture 20 - Curve fitting, Newton Raphson method
- Lecture 21 - Random numbers, Numerical integration using Simpson's rule
- Lecture 22 - Numerical Integration and Differential Equations
- Lecture 23 - Practical Session on Programming 3
- Lecture 24 - Scilab-2
- Lecture 25 - Scilab-3
- Lecture 26 - Scilab-4
- Lecture 27 - Scilab-5
- Lecture 28 - Scilab-6
- Lecture 29 - Classical Molecular Dynamics-2, Force Fields and Equations of Motion

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- Lecture 30 - Classical Molecular Dynamics-3, Force Fields and MD Algorithms
- Lecture 31 - Classical MD-4 Thermodynamic Properties and Distribution Functions.
- Lecture 32 - Classical MD-5, Execution of programs on liquid argon
- Lecture 33 - Molecular Dynamics using Gromacs-1
- Lecture 34 - Molecular Dynamics using Gromacs-2
- Lecture 35 - Molecular Dynamics using Gromacs-3
- Lecture 36 - Molecular Dynamics using Gromacs-4
- Lecture 37 - Molecular Dynamics using Gromacs-5
- Lecture 38 - Molecular Dynamics using Gromacs-6
- Lecture 39 - Molecular Dynamics using Gromacs-7
- Lecture 40 - Molecular Dynamics using Gromacs-8
- Lecture 41 - Molecular Dynamics using Gromacs-9

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NPTEL Video Course - Chemistry and Biochemistry - Chemistry of Materials

Subject Co-ordinator - Prof. S. Sundar Manoharan

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Introduction to Materials Chemistry
- Lecture 2 - Preparative routes
- Lecture 3 - Preparative routes
- Lecture 4 - Preparative routes
- Lecture 5 - Preparative routes
- Lecture 6 - Preparative routes
- Lecture 7 - Preparative routes
- Lecture 8 - Preparative routes
- Lecture 9 - Preparative routes
- Lecture 10 - Molecular Beam Epitaxy
- Lecture 11 - Pulsed Laser Deposition
- Lecture 12 - Pulsed Electron Deposition
- Lecture 13 - Sputtering deposited thin films and applications
- Lecture 14 - Crystal growth-Single crystals.
- Lecture 15 - Applications of X-ray diffraction
- Lecture 16 - Applications of X-ray Photoelectron spectroscopy
- Lecture 17 - Applications of X-ray Absorption spectroscopy
- Lecture 18 - Applications of Thermal analysis techniques
- Lecture 19 - Applications of Scanning Tunneling microscopy
- Lecture 20 - Applications of Electron Microscopy
- Lecture 21 - Case Study of ZnO
- Lecture 22 - Magnetic materials - I
- Lecture 23 - Magnetic Materials - II
- Lecture 24 - Magnetic Materials - III & Related Phenomena
- Lecture 25 - Shape Memory Materials
- Lecture 26 - Spintronic Materials - I Colossal Magnetoresistive Oxides
- Lecture 27 - Spintronic Materials - II Giant Magnetoresistive Materials
- Lecture 28 - Spintronic Materials - III Tunneling Magnetoresistive Materials
- Lecture 29 - Spintronic Materials - IV Dilute Magnetic Semiconductors

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- Lecture 30 - High Tc Superconductors
- Lecture 31 - The New Carbon family - I - Fullerenes and Nanotubes
- Lecture 32 - The New Carbon family - II - Graphene
- Lecture 33 - Optoelectronic Materials - I - OLEDs
- Lecture 34 - Optoelectronic Materials - II - OLEDs
- Lecture 35 - Inorganic Phosphors - I
- Lecture 36 - Inorganic Phosphors - II
- Lecture 37 - Phosphor Materials
- Lecture 38 - Solar Cells
- Lecture 39 - Interview with C N R Rao and Interview with E C Subba Rao
- Lecture 40 - Perceptions & Projections

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

NPTEL Video Course - Chemistry and Biochemistry - Mathematics for Chemistry

Subject Co-ordinator - Dr. Madhav Ranganathan, Dr. P.P. Thankachan

Co-ordinating Institute - IIT - Kanpur | IIT - Roorkee

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

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

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Lecture 31 - Mathematics for Chemistry
Lecture 32 - Mathematics for Chemistry
Lecture 33 - Mathematics for Chemistry
Lecture 34 - Mathematics for Chemistry
Lecture 35 - Mathematics for Chemistry
Lecture 36 - Mathematics for Chemistry
Lecture 37 - Mathematics for Chemistry
Lecture 38 - Mathematics for Chemistry
Lecture 39 - Mathematics for Chemistry
Lecture 40 - Mathematics for Chemistry

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NPTEL Video Course - Chemistry and Biochemistry - Advance Analytical Course

Subject Co-ordinator - Dr. Padma S Vankar

Co-ordinating Institute - IIT - Kanpur

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

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

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Lecture 30 - Advance Analytical Course
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Lecture 35 - Advance Analytical Course
Lecture 36 - Advance Analytical Course
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Lecture 38 - Advance Analytical Course
Lecture 39 - Advance Analytical Course
Lecture 40 - Advance Analytical Course

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemical Applications of Symmetry and Group Theory

Subject Co-ordinator - Prof. Manabendra Chandra

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1
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Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19
Lecture 20
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Lecture 22
Lecture 23
Lecture 24
Lecture 25
Lecture 26
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Lecture 28
Lecture 29

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Lecture 39
Lecture 40

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Mathematics for Chemistry

Subject Co-ordinator - Dr. Madhav Ranganathan

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Errors, precision and accuracy
- Lecture 2 - Probability and distributions
- Lecture 3 - Gaussian distribution and integrals
- Lecture 4 - Gaussian distribution, integrals, averages
- Lecture 5 - Practice problems 1
- Lecture 6 - Vectors and Vector Spaces
- Lecture 7 - Linear Independence
- Lecture 8 - Scalar and vector fields
- Lecture 9 - Gradient, divergence and curl
- Lecture 10 - Practice problems 2
- Lecture 11 - Line integrals, Potential Theory
- Lecture 12 - Surface and Volume Integrals
- Lecture 13 - Matrices
- Lecture 14 - Linear Systems, Cramer's Rule
- Lecture 15 - Practice Problems 3
- Lecture 16 - Rank and Inverse of a Matrix
- Lecture 17 - Eigenvalues and Eigenvectors
- Lecture 18 - Special matrices
- Lecture 19 - Spectral decomposition and Normal modes
- Lecture 20 - Practice Problems 4
- Lecture 21 - Differential equations, Order
- Lecture 22 - Exact and Inexact differentials
- Lecture 23 - Integrating Factors
- Lecture 24 - System of 1st order ODEs, matrix methods
- Lecture 25 - Practice Problems 5
- Lecture 26 - Types of 2nd order ODEs, nature of solutions
- Lecture 27 - Homogeneous 2nd order ODEs
- Lecture 28 - Homogeneous and nonhomogeneous equations
- Lecture 29 - Nonhomogeneous equations \hat{A} Variation of parameters

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

- Lecture 30 - Practice Problems 6
- Lecture 31 - Power series method for solving Legendre DE
- Lecture 32 - Properties of Legendre Polynomials
- Lecture 33 - Associated Legendre Polynomials, Spherical Harmonics
- Lecture 34 - Hermite Polynomials, Solution of Quantum Harmonic Oscillator
- Lecture 35 - Practice Problems 7
- Lecture 36 - Conditions for power series solution
- Lecture 37 - Frobenius Method, Bessel Functions
- Lecture 38 - Properties of Bessel Functions, circular boundary problems
- Lecture 39 - Leguerre Polynomials, solution to radial part of H-atom
- Lecture 40 - Practice Problems 8

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Quantum Computing

Subject Co-ordinator - Prof. Debabrata Goswami

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Introduction - Motivation and Overview
Lecture 2 - Introduction - Technical Details
Lecture 3 - Introduction - Basic tools
Lecture 4 - Computational Tools
Lecture 5 - Quantum Measurement and Teleportation
Lecture 6 - Quantum Teleportation and Cryptography
Lecture 7 - DJ Algorithm and Implementation Aspects
Lecture 8 - Grover's Algorithm
Lecture 9 - Basics of Shor's Algorithm
Lecture 10 - Shor's Algorithm and Quantum Fourier Transform (QFT)
Lecture 11 - Basics of Quantum Mechanics
Lecture 12 - Modern look at Quantum Mechanics
Lecture 13 - Basics of NMR
Lecture 14 - Concepts in NMR Quantum Computing
Lecture 15 - Laser Basics
Lecture 16 - Continuous Wave Lasers
Lecture 17 - Pulsed Lasers
Lecture 18
Lecture 19
Lecture 20
Lecture 21 - Optical Implementation
Lecture 22 - Solutions to problem set - 1
Lecture 23 - Basics of Ion Traps
Lecture 24 - Applications of Ion Traps in QIQC
Lecture 25 - Reviewing Concepts and clarifying problems - 1
Lecture 26 - Reviewing Concepts and clarifying problems - 2
Lecture 27 - Qubits used in Commercial Quantum Computing
Lecture 28 - Spintronics Quantum Computing
Lecture 29 - Back to Basics - I

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- Lecture 30 - Back to Basics - II
- Lecture 31 - Understanding Implementation Issues from the Basics - I
- Lecture 32 - Understanding Implementation Issues from the Basics - II
- Lecture 33 - Implementation with Solid-State Super conducting Qubits
- Lecture 34 - Concept of Density Matrix for Quantum Computing
- Lecture 35 - Understanding the ensemble of Qubits from Density Matrix
- Lecture 36 - Understanding Quantum Measurement, Entanglement etc. in Quantum Computing using Density Matrix
- Lecture 37 - Principles
- Lecture 38 - Measurements
- Lecture 39 - Working of Quantum Computers
- Lecture 40 - Academic Development in Quantum Computing - I
- Lecture 41 - Academic Development in Quantum Computing - II
- Lecture 42 - Commercial Development in Quantum Computing Implementation
- Lecture 43 - Use of Atomic Qubits in Quantum Computing
- Lecture 44 - Futuristic Aspects in Implementing Quantum Computing - I
- Lecture 45 - Futuristic Aspects in Implementing Quantum Computing - II

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Basics of Fluorescence Spectroscopy

Subject Co-ordinator - Prof. Pratik Sen

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1
Lecture 2
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Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
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Lecture 20
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Lecture 23
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Lecture 29

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Laser: Fundamentals and Applications

Subject Co-ordinator - Prof. Manabendra Chandra

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Unique properties of LASERS and their applications
- Lecture 2 - LASER and its history
- Lecture 3 - Interaction of Light with matter
- Lecture 4 - Einsteins Concept of stimulated emission
- Lecture 5 - Calculation of Einsteins coefficient
- Lecture 6 - Population inversion, 2-level system and 3-level system
- Lecture 7 - 3-level System and 4-level system
- Lecture 8 - Components of LASERS
- Lecture 9 - Modes of LASER cavity and standing waves
- Lecture 10 - Transverse Modes of LASER cavity
- Lecture 11 - Threshold Condition
- Lecture 12 - Properties of Laser
- Lecture 13 - Properties of Laser
- Lecture 14 - Continuous and Pulsed Lasers
- Lecture 15 - Some Numerical problem
- Lecture 16 - Cavity Dumping
- Lecture 17 - Q-switching
- Lecture 18 - Q-switching and Pockels effect
- Lecture 19 - Passive Q-switching, Mode-Locking
- Lecture 20 - Mode Locking
- Lecture 21 - Mode - locking
- Lecture 22 - Mode - locking (Continued...)
- Lecture 23 - Passive Mode - locking and Types of LASERS
- Lecture 24 - Solid state LASERS
- Lecture 25 - Semiconductor LASERS and Gas LASERS
- Lecture 26 - Gas LASERS
- Lecture 27 - Chemical and Dye LASERS
- Lecture 28 - Introduction to Non Linear Optics
- Lecture 29 - Non Linear Optics

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- Lecture 30 - 2nd order Nonlinear optics
- Lecture 31 - Non-linear optical processes
- Lecture 32 - Aspects of SHG and Application of non-linear optics
- Lecture 33 - Application of LASER
- Lecture 34 - Application of Laser
- Lecture 35 - Application of Laser
- Lecture 36 - Laser Induced Chemistry
- Lecture 37 - Laser Induced Chemistry and Ultrafast chemical Dynamics
- Lecture 38 - Lasers in Medical Sciences
- Lecture 39 - Lasers in Material sciences and engineering and Optical Communications
- Lecture 40 - Laser safety and summary

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Advanced Mathematical Methods for Chemistry

Subject Co-ordinator - Prof. Madhav Ranganathan

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Vectors, Vector Operations and Linear Independence
- Lecture 2 - Vector Operations, Generalization of Vectors
- Lecture 3 - Vector Differentiation, Vector Transformations
- Lecture 4 - Vector Integration, Line, Surface and Volume Integrals
- Lecture 5 - Practice Problems
- Lecture 6 - Matrix as a vector transformation, linear system
- Lecture 7 - Special Matrices
- Lecture 8 - Rotational Matrices, Eigenvalues and Eigenvectors
- Lecture 9 - Determinants, Matrix Inverse
- Lecture 10 - Practice Problems
- Lecture 11 - Step Function, Delta Function
- Lecture 12 - Gamma Function, Error Function
- Lecture 13 - Spherical Polar Coordinates
- Lecture 14 - Cylindrical Polar Coordinates, Integrals
- Lecture 15 - Recap of Module 3, Practice Problems
- Lecture 16 - ODEs and PDEs, First order ODEs, system of 1st order ODEs
- Lecture 17 - First order ODEs, exact integrals, integrating factors
- Lecture 18 - System of first order ODEs, Linear first order ODEs
- Lecture 19 - General solution of a system of linear first order ODEs with constant coefficients
- Lecture 20 - Recap of Module 4, Practice problems
- Lecture 21 - Homogeneous 2nd Order ODE, Basis Functions
- Lecture 22 - Nonhomogeneous 2nd Order ODE
- Lecture 23 - Power Series Method of Solving ODEs
- Lecture 24 - Frobenius Method / Power Series Method
- Lecture 25 - Time-independent Schrodinger Equation for H-atom
- Lecture 26 - Maxima and Minima, Taylor Series
- Lecture 27 - Taylor Series for functions of several variables
- Lecture 28 - Critical Points of Functions
- Lecture 29 - Lagranges Method of Undetermined Multipliers

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- Lecture 30 - Recap of Module 6, Practice Problems
- Lecture 31 - Nonlinear Differential Equations
- Lecture 32 - Phase Plane of A Pendulum
- Lecture 33 - Stability of Critical Points
- Lecture 34 - Population Dynamics Models
- Lecture 35 - Recap of Module 7, Practice Problems
- Lecture 36 - Fourier Series, Fourier Expansion of Periodic Functions
- Lecture 37 - (Part A)
- Lecture 38 - (Part B)
- Lecture 39 - Orthogonal Eigenfunctions, Sturm-Liouville Theory
- Lecture 40 - Recap of Module 8, Practice Problems
- Lecture 41 - Fourier Transforms
- Lecture 42 - Properties of Fourier Transforms
- Lecture 43 - Fourier Transforms and Partial Differential Equations
- Lecture 44 - Laplace Transforms
- Lecture 45 - Recap of Module 9, Practice Problems
- Lecture 46 - Partial Differential Equations, Boundary Conditions
- Lecture 47 - Separation of Variables
- Lecture 48 - (Part A)
- Lecture 49 - (Part B)
- Lecture 50 - Recap of Module 10, Practice Problems
- Lecture 51 - Discrete and Continuous Random Variables
- Lecture 52 - Probability Distribution Functions
- Lecture 53 - Poisson Distribution, Gaussain Distribution
- Lecture 54 - Error Estimates, Least Square Fit, Correlation Functions
- Lecture 55 - Recap of Module 11, Practice Problems

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

NPTEL Video Course - Chemistry and Biochemistry - Bio-inorganic chemistry

Subject Co-ordinator - Prof. D. Ray

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction
- Lecture 2 - Iron Storage and Transport - I
- Lecture 3 - Iron Storage and Transport - II
- Lecture 4 - Iron Storage and Transport - III
- Lecture 5 - Electron Transport Proteins - I
- Lecture 6 - Electron transport Proteins - II
- Lecture 7 - Electron Transport Proteins - III
- Lecture 8 - Electron Transport Proteins - IV
- Lecture 9 - Electron Transport Proteins - V
- Lecture 10 - Electron Transport Proteins - VI
- Lecture 11 - Electron Transport Proteins - VII
- Lecture 12 - Electron Transport Proteins - VIII
- Lecture 13 - Electron Transport Proteins - IX
- Lecture 14 - Electron Transfer in Photosynthesis - I
- Lecture 15 - Electron Transfer in Photosynthesis - II
- Lecture 16 - Manganese Enzymes
- Lecture 17 - Nickel Enzymes - I
- Lecture 18 - Nickel Enzymes - II
- Lecture 19 - Nickel Enzymes - III
- Lecture 20 - Nickel Enzymes - IV
- Lecture 21 - Nickel Enzymes - V
- Lecture 22 - Molybdenum Enzymes - I
- Lecture 23 - Molybdenum Enzymes - II
- Lecture 24 - Molybdenum Enzymes - III
- Lecture 25 - Molybdenum Enzymes - IV
- Lecture 26 - Molybdenum Enzymes - V
- Lecture 27 - Molybdenum Enzymes - VI
- Lecture 28 - Molybdenum and Tungsten in Biology
- Lecture 29 - Tungsten Enzymes - I

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

- Lecture 30 - Tungsten Enzymes - II
- Lecture 31 - Tungsten Enzymes - III
- Lecture 32 - Tungsten Enzymes - IV
- Lecture 33 - Vanadium Enzymes - I
- Lecture 34 - Vanadium Enzymes - II
- Lecture 35 - Vanadium Enzymes - III
- Lecture 36 - Vanadium Enzymes - IV
- Lecture 37 - Non-metals in Biology - I
- Lecture 38 - Non-metals in Biology - II
- Lecture 39 - Non-metals in Biology - III
- Lecture 40 - Non-metals in Biology - IV

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

NPTEL Video Course - Chemistry and Biochemistry - Co-ordination chemistry (chemistry of transition elements)

Subject Co-ordinator - Prof. D. Ray

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction
- Lecture 2 - Definition
- Lecture 3 - Classification of Ligands - I
- Lecture 4 - Classification of Ligands - II
- Lecture 5 - Ligands - III and Nomenclature - I
- Lecture 6 - Nomenclature - II
- Lecture 7 - Coordination Number - I
- Lecture 8 - Coordination Number - II
- Lecture 9 - Coordination Number - III
- Lecture 10 - Coordination Number - IV
- Lecture 11 - Isomerism - I
- Lecture 12 - Isomerism - II
- Lecture 13 - Coordination Equilibria - I
- Lecture 14 - Coordination Equilibria - II
- Lecture 15 - Bonding in Complexes - I
- Lecture 16 - Bonding in Complexes - II
- Lecture 17 - Bonding in Complexes - III
- Lecture 18 - Bonding in Complexes - IV
- Lecture 19 - Jahn-Teller Effect
- Lecture 20 - Spin Crossover and Colour
- Lecture 21 - Optical Spectra
- Lecture 22 - d-d Transitions
- Lecture 23 - Charge Transfer
- Lecture 24 - Orgel Diagram
- Lecture 25 - Tanabe Sugano Diagram
- Lecture 26 - MLCT Transitions
- Lecture 27 - Application of CFT
- Lecture 28 - Spinels
- Lecture 29 - Magnetochemistry

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- Lecture 30 - Magnetic Properties
- Lecture 31 - Magnetic Measurements
- Lecture 32 - Ligand Field Theory
- Lecture 33 - Sigma Orbitals
- Lecture 34 - Pi Orbitals
- Lecture 35 - Reaction Mechanism - I
- Lecture 36 - Reaction Mechanism - II
- Lecture 37 - Reaction Mechanism - III
- Lecture 38 - Reaction Mechanism - IV
- Lecture 39 - Reaction Mechanism - V
- Lecture 40 - Biological Inorganic Chemistry

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

NPTEL Video Course - Chemistry and Biochemistry - Heterocyclic Chemistry

Subject Co-ordinator - Prof. D.R. Mal

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Definition and Scope
- Lecture 2 - Single - Step Methods for IVPs
- Lecture 3 - Systematic Nomenclature
- Lecture 4 - Nomenclature (Continued...) and Important Names
- Lecture 5 - Overview of Structure Determination in Heterocyclic Chemistry
- Lecture 6 - ^{15}N NMR in Heterocyclic Chemistry
- Lecture 7 - Effects of Ring Nitrogen - A
- Lecture 8 - Effects of Ring Nitrogen - B
- Lecture 9 - Effects of Ring Nitrogen - C
- Lecture 10 - Oxidation in Heterocyclic Chemistry
- Lecture 11 - Oxidation in Heterocyclic Chemistry (Continued...)
- Lecture 12 - Reduction in Heterocyclic Chemistry
- Lecture 13 - Radicals in Heterocyclic Chemistry - I
- Lecture 14 - Radicals in Heterocyclic Chemistry - II
- Lecture 15 - Lithiation for 5-membered heterocycles
- Lecture 16 - Lithiation for 5-membered heterocycles (Continued...)
- Lecture 17 - Lithiation of 6-membered heterocycle and non-aromatic heterocycles
- Lecture 18 - Magnetiation and Zincation in Heterocyclic Chemistry
- Lecture 19 - Transition metal catalyzed cross coupling
- Lecture 20 - Transition metal catalyzed cross coupling (Continued...)
- Lecture 21 - Dehydrogenative (Oxidative) cross coupling
- Lecture 22 - Tert-amino effect in heterocycle synthesis
- Lecture 23 - [4 plus 2] cycloaddition in heterocyclic chemistry
- Lecture 24 - [4 plus 2] cycloaddition in heterocyclic chemistry (Continued...)
- Lecture 25 - [3 plus 2] Cycloaddition in heterocyclic chemistry
- Lecture 26 - Cycloaddition
- Lecture 27 - [4 plus 3] Cycloaddition
- Lecture 28 - [5 plus 2] Cycloaddition
- Lecture 29 - [2 plus 2 plus 2] Cycloaddition

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- Lecture 30 - Pyrrole Synthesis - I
- Lecture 31 - Pyrrole Synthesis - II
- Lecture 32 - Indole Synthesis - I
- Lecture 33 - Indole Synthesis - II
- Lecture 34 - Furan Synthesis
- Lecture 35 - Thiophene Synthesis
- Lecture 36 - Oxazole, Imidazole and Thiazole Synthesis
- Lecture 37 - Pyridine Synthesis
- Lecture 38 - Synthesis of Quinolines and Isoquinolines
- Lecture 39 - Bicyclic Polyheteroatomic Heterocycles
- Lecture 40 - Heterocyclic Rearrangements

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NPTEL Video Course - Chemistry and Biochemistry - Organic photochemistry and pericyclic reactions

Subject Co-ordinator - Dr. N.D. Pradeep Singh

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to Organic Photochemistry
- Lecture 2 - Introduction to Organic Photochemistry (Continued...)
- Lecture 3 - Reactivity of $n\text{-}\pi^*$
- Lecture 4 - $\hat{I}\pm$ - cleavage - I
- Lecture 5 - $\hat{I}\pm$ - cleavage - II
- Lecture 6 - $\hat{I}\pm$ - cleavage - III
- Lecture 7 - \hat{I}^2 - cleavage
- Lecture 8 - Intramolecular Hydrogen Abstraction - I
- Lecture 9 - Intramolecular Hydrogen Abstraction - II
- Lecture 10 - Intramolecular Hydrogen Abstraction - III
- Lecture 11 - Intramolecular Hydrogen Abstraction
- Lecture 12 - Addition to \hat{I} - System
- Lecture 13 - Intramolecular Paterno-Buchi Reaction
- Lecture 14 - Energy of Electron Transfer Reaction
- Lecture 15 - Reactivity of $\hat{I} - \hat{I}^*$
- Lecture 16 - Addition Reaction of $\hat{I} - \hat{I}^*$
- Lecture 17 - Addition Reaction of $\hat{I} - \hat{I}^*$ (Continued...)
- Lecture 18 - Di-Pi Methane Rearrangement
- Lecture 19 - Photochemistry of Cyclohexanone
- Lecture 20 - Singlet Oxygen Chemistry
- Lecture 21 - Carbenes and Nitrenes
- Lecture 22 - Remote Functionalisation
- Lecture 23 - Introduction to Pericyclic Reaction
- Lecture 24 - Sigmatropic Reactions - I
- Lecture 25 - Sigmatropic Reactions - II
- Lecture 26 - Sigmatropic Reactions - III
- Lecture 27 - Cycloaddition Reactions - I
- Lecture 28 - Cycloaddition Reactions - II
- Lecture 29 - Cycloaddition - Diels-Alder Reactions

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- Lecture 30 - Cycloaddition - Diels-Alder Reactions (Continued...)
- Lecture 31 - Cycloaddition - Ene Reactions
- Lecture 32 - 1,3 Dipolar Cycloaddition - I
- Lecture 33 - 1,3 Dipolar Cycloaddition - II
- Lecture 34 - Electrocyclic Reaction - I
- Lecture 35 - Electrocyclic Reaction - II
- Lecture 36 - Practice Problems in Pericyclic Reaction - I
- Lecture 37 - Practice Problems in Pericyclic Reaction - II
- Lecture 38 - Practice Problems in Pericyclic Reaction - III
- Lecture 39 - Chelotropic Reaction
- Lecture 40 - Application of Photochemistry

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

NPTEL Video Course - Chemistry and Biochemistry - Polymer Chemistry

Subject Co-ordinator - Dr. D. Dhara

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction to Polymers
- Lecture 2 - Introduction to Polymers (Continued...)
- Lecture 3 - Introduction to Polymers (Continued...)
- Lecture 4 - Step - growth Polymerization
- Lecture 5 - Step - growth Polymerization (Continued...)
- Lecture 6 - Step - growth Polymerization (Continued...)
- Lecture 7 - Step - growth Polymerization (Continued...)
- Lecture 8 - Step - growth Polymerization (Continued...)
- Lecture 9 - Radical Chain Polymerization
- Lecture 10 - Radical Chain Polymerization (Continued...)
- Lecture 11 - Radical Chain Polymerization (Continued...)
- Lecture 12 - Radical Chain Polymerization (Continued...)
- Lecture 13 - Radical Chain Polymerization (Continued...)
- Lecture 14 - Radical Chain Polymerization (Continued...)
- Lecture 15 - Radical Chain Polymerization (Continued...)
- Lecture 16 - Radical Chain Polymerization (Continued...)
- Lecture 17 - Ionic Chain Polymerization
- Lecture 18 - Ionic Chain Polymerization (Continued...)
- Lecture 19 - Ionic Chain Polymerization (Continued...) and Chain Copolymerization
- Lecture 20 - Chain Copolymerization (Continued...)
- Lecture 21 - Chain Copolymerization (Continued...)
- Lecture 22 - Chain Copolymerization (Continued...) and Ring Opening Polymerization
- Lecture 23 - Polymer Stereochemistry and Coordination Polymerization
- Lecture 24 - Polymer Stereochemistry and Coordination Polymerization (Continued...)
- Lecture 25 - Polymer Solutions
- Lecture 26 - Polymer Solutions (Continued...)
- Lecture 27 - Polymer Solutions (Continued...)
- Lecture 28 - Polymer Solutions (Continued...) and Chain Dimensions
- Lecture 29 - Chain Dimensions (Continued...) and Frictional Properties of Solution

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- Lecture 30 - Frictional Properties of Solutions (Continued...) and Determination of Molecular Weight
- Lecture 31 - Determination of Molecular Weight of Polymers (Continued...)
- Lecture 32 - Determination of Molecular Weight of Polymers (Continued...)
- Lecture 33 - Determination of Molecular Weight of Polymers (Continued...)
- Lecture 34 - Structural Analysis of Polymers by Spectroscopic Methods
- Lecture 35 - Amorphous and Crystalline State
- Lecture 36 - Amorphous and Crystalline State
- Lecture 37 - Polymer Properties and Evaluation
- Lecture 38 - Polymer Properties and Evaluation
- Lecture 39 - Other Properties (Continued...) and Polymer Additives
- Lecture 40 - Polymer Additives (Continued...)
- Lecture 41 - Polymer Additives (Continued...), Blends, Concluding Remarks

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NPTEL Video Course - Chemistry and Biochemistry - Rate processes

Subject Co-ordinator - Dr. M. Halder

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Rate Processes
- Lecture 2 - Reaction Rates and Rate Laws
- Lecture 3 - Effect of Temperature on Reaction Rate
- Lecture 4 - Effect of Temperature on Reaction Rate (Continued...)
- Lecture 5 - Complex Reaction
- Lecture 6 - Complex Reaction (Continued...)
- Lecture 7 - Complex Reaction (Continued...)
- Lecture 8 - Complex Reaction (Continued...)
- Lecture 9 - Theories of Reaction Rate
- Lecture 10 - Theories of Reaction Rate (Continued...)
- Lecture 11 - Theories of Reaction Rate (Continued...)
- Lecture 12 - Theories of Reaction Rate (Continued...)
- Lecture 13 - Theories of Reaction Rate (Continued...)
- Lecture 14 - Kinetics of Some Specific Reactions
- Lecture 15 - Kinetics of Some Specific Reactions (Continued...)
- Lecture 16 - Enzyme Inhibition
- Lecture 17 - Oscillatory Reactions
- Lecture 18 - Acid Base Catalysis
- Lecture 19 - Acid Base Catalysis (Continued...)
- Lecture 20 - Kinetic Isotope Effects
- Lecture 21 - Fast Reactions
- Lecture 22 - Fast Reactions (Continued...)
- Lecture 23 - Magneto Kinetics
- Lecture 24 - Reactions in Solutions
- Lecture 25 - Reactions in Solutions (Continued...)
- Lecture 26 - Kinetics at Electrodes
- Lecture 27 - Kinetics at Electrodes (Continued...)
- Lecture 28 - Ultrafast Process
- Lecture 29 - Ultrafast Process (Continued...)

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- Lecture 30 - Ultrafast Process (Continued...)
- Lecture 31 - Reaction Dynamics
- Lecture 32 - Reaction Dynamics (Continued...)
- Lecture 33 - Reaction Dynamics (Continued...)
- Lecture 34 - Reaction Dynamics
- Lecture 35 - Reaction Dynamics
- Lecture 36 - Reaction Dynamics
- Lecture 37 - Reaction Dynamics
- Lecture 38 - Reaction Dynamics
- Lecture 39 - Reaction Dynamics
- Lecture 40 - Concluding Remarks

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Biochemistry

Subject Co-ordinator - Prof. S. Dasgupta

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Amino Acid 1
Lecture 2 - Amino Acid 2
Lecture 3 - Protein Structure - I
Lecture 4 - Protein Structure - II
Lecture 5 - Protein Structure - III
Lecture 6 - Protein Structure - IV
Lecture 7 - Enzymes - I
Lecture 8 - Enzymes - II
Lecture 9 - Enzymes - III
Lecture 10 - Myoglobin and Hemoglobin
Lecture 11 - Enzyme Mechanisms - I
Lecture 12 - Enzyme Mechanisms - II
Lecture 13 - Nucleic Acids - I
Lecture 14 - Nucleic Acids - II
Lecture 15 - Nucleic Acids - III
Lecture 16 - Nucleic Acids - I
Lecture 17 - Nucleic Acids - II
Lecture 18 - Nucleic Acids - III
Lecture 19 - Vitamins and Coenzymes - I
Lecture 20 - Vitamins and Coenzymes - II
Lecture 21 - Carbohydrates - I
Lecture 22 - Carbohydrates - II
Lecture 23 - Bioenergetics - I
Lecture 24 - Bioenergetics - II
Lecture 25 - Metabolism - I
Lecture 26 - Metabolism - II
Lecture 27 - Metabolism - III

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Analytical Chemistry

Subject Co-ordinator - Prof. Debashis Ray

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Chemicals and Materials Analysis
- Lecture 2 - Methods
- Lecture 3 - Methods (Continued...)
- Lecture 4 - Methods (Continued...)
- Lecture 5 - Methods (Continued...)
- Lecture 6 - Role of Analytical Chemistry
- Lecture 7 - Techniques, Wet Ashing
- Lecture 8 - Apparatus and Weighing
- Lecture 9 - Filtration, Ignition
- Lecture 10 - Crucibles, Filter Papers and their Uses
- Lecture 11 - Chemical Equilibria
- Lecture 12 - Chemical Equilibria (Continued...)
- Lecture 13 - Chemical Equilibria (Continued...)
- Lecture 14 - Chemical Equilibria (Continued...)
- Lecture 15 - Chemical Equilibria (Continued...)
- Lecture 16 - Spectrochemic Methods - I
- Lecture 17 - Spectrochemic Methods - I (Continued...)
- Lecture 18 - Spectrochemic Methods - I (Continued...)
- Lecture 19 - Spectrochemic Methods - I (Continued...)
- Lecture 20 - Spectrochemic Methods - I (Continued...)
- Lecture 21 - Spectrochemical Methods - II
- Lecture 22 - Spectrochemical Methods - II (Continued...)
- Lecture 23 - Spectrochemical Methods - II (Continued...)
- Lecture 24 - Spectrochemical Methods - II (Continued...)
- Lecture 25 - Spectrochemical Methods - II (Continued...)
- Lecture 26 - Spectrochemical Methods - III
- Lecture 27 - Spectrochemical Methods - III (Continued...)
- Lecture 28 - Spectrochemical Methods - III (Continued...)
- Lecture 29 - Spectrochemical Methods - III (Continued...)

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- Lecture 30 - Spectrochemical Methods - III (Continued...)
- Lecture 31 - Thermal Methods of Analysis - I
- Lecture 32 - Thermal Methods of Analysis - I (Continued...)
- Lecture 33 - Thermal Methods of Analysis - I (Continued...)
- Lecture 34 - Thermal Methods of Analysis - I (Continued...)
- Lecture 35 - Thermal Methods of Analysis - I (Continued...)
- Lecture 36 - Thermal Methods of Analysis - II
- Lecture 37 - Thermal Methods of Analysis - II (Continued...)
- Lecture 38 - Thermal Methods of Analysis - II (Continued...)
- Lecture 39 - Thermal Methods of Analysis - II (Continued...)
- Lecture 40 - Thermal Methods of Analysis - II (Continued...)
- Lecture 41 - Electrochemical Methods - I
- Lecture 42 - Electrochemical Methods - I (Continued...)
- Lecture 43 - Electrochemical Methods - I (Continued...)
- Lecture 44 - Electrochemical Methods - I (Continued...)
- Lecture 45 - Electrochemical Methods - I (Continued...)
- Lecture 46 - Electrochemical Methods - II
- Lecture 47 - Electrochemical Methods - II (Continued...)
- Lecture 48 - Electrochemical Methods - II (Continued...)
- Lecture 49 - Electrochemical Methods - II (Continued...)
- Lecture 50 - Electrochemical Methods - II (Continued...)
- Lecture 51 - Electrochemical Methods - III
- Lecture 52 - Electrochemical Methods - III (Continued...)
- Lecture 53 - Electrochemical Methods - III (Continued...)
- Lecture 54 - Electrochemical Methods - III (Continued...)
- Lecture 55 - Electrochemical Methods - III (Continued...)
- Lecture 56 - Applications
- Lecture 57 - Applications (Continued...)
- Lecture 58 - Applications (Continued...)
- Lecture 59 - Applications (Continued...)
- Lecture 60 - Applications (Continued...)

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Stereochemistry

Subject Co-ordinator - Prof. A. Basak

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Constitution and Configuration
- Lecture 2 - Chirality, Symmetry Elements
- Lecture 3 - Project Ion Formulae Rules for Drawing
- Lecture 4 - Chirotopicity and Stereogenicity
- Lecture 5 - Newmann Projection, Saw Horse Projection, Wedge Formula
- Lecture 6 - Chirotopicity and Stereogenicity
- Lecture 7 - Absolute Configuration
- Lecture 8 - Absolute Configuration (Continued...)
- Lecture 9 - Problems on the above topics
- Lecture 10 - Topicity
- Lecture 11 - Axial Chirality in Allenes, Biphenyls
- Lecture 12 - Relative Configuration, Prochiral Faces and Prochiral Centres
- Lecture 13 - Chirality in Heteroatom Systems
- Lecture 14 - Conformations and Conformers
- Lecture 15 - Conformational Analysis of Acyclic Molecules
- Lecture 16 - Conformational Analysis of Acyclic Molecules (Continued...)
- Lecture 17 - Conformations of Acyclic Molecules Containing Heteroatoms
- Lecture 18 - Conformations of Cyclic Systems
- Lecture 19 - Conformations of Cyclic Systems (Continued...)
- Lecture 20 - Conformation of Cyclobutane and Cyclopentane
- Lecture 21 - Conformation of Cyclohexane
- Lecture 22 - Energy Changes During Flipping
- Lecture 23 - Energy Comparison between Chair and Boat Conformations
- Lecture 24 - Conformational Analysis of Substituted Cyclohexanes
- Lecture 25 - Conformational Analysis of Substituted Cyclohexanes (Continued...)
- Lecture 26 - Conformational Analysis of Substituted Cyclohexanes (Continued...)
- Lecture 27 - Conformational Analysis of Substituted Cyclohexanes (Continued...)
- Lecture 28 - Conformational Analysis of Systems with Preference for Axial Groups
- Lecture 29 - Conformation and Reactivity

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- Lecture 30 - Conformation and Reactivity (Continued...)
- Lecture 31 - Conformation and Reactivity (Continued...)
- Lecture 32 - Stereoelectronic Effects
- Lecture 33 - Stereoelectronic Effects (Continued...)
- Lecture 34 - Substitution and Elimination in Cyclohexane Systems
- Lecture 35 - Stereospecific and Stereoselective Reactions and Asymmetric Synthesis (Elementary Idea)
- Lecture 36 - Asymmetric Induction
- Lecture 37 - Asymmetric Induction
- Lecture 38 - Asymmetric Induction (Continued...)
- Lecture 39 - Facial Selectivity and Examples of Asymmetric Synthesis
- Lecture 40 - Revisiting the Contents Covered

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NPTel Video Course - Chemistry and Biochemistry - NOC:A Study Guide in Organic Retrosynthesis - Problem Solving

Subject Co-ordinator - Prof. Samik Nanda

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introductory Remarks
- Lecture 2 - Introductory remarks (Continued...)
- Lecture 3 - Introductory remarks and some rapid fire quiz
- Lecture 4 - Retro Quiz based on simple Transformation
- Lecture 5 - Transformation based strategy for a given target
- Lecture 6 - Tf/Fg/SM based strategy and its exploration
- Lecture 7 - Tf/SM/Fg based approaches to solve some basic problems
- Lecture 8 - Tf/SM/Fg based strategy and its exploration
- Lecture 9 - Tf/SM/Fg based strategy and its exploration for some simple target molecules
- Lecture 10 - Tf/SM/Fg based strategy and its exploration
- Lecture 11 - Tf/SM/Fg based strategies and its exploration
- Lecture 12 - Tf/Fg/SM based strategies and its exploration
- Lecture 13 - Tf/Fg/SM based approaches and its exploration
- Lecture 14 - Tf/Fg/SM based strategies and its exploration
- Lecture 15 - Multiple Tf based strategy for small molecule disconnection
- Lecture 16 - Multiple Tf based strategies
- Lecture 17 - Specific Tf such as Barton's nitrile ester photolysis
- Lecture 18 - Specific transformation
- Lecture 19 - Selective transformations
- Lecture 20 - Functional Group (Fg) based strategies
- Lecture 21 - Functional group based strategy
- Lecture 22 - Fg based strategy
- Lecture 23 - Fg based strategy
- Lecture 24 - Fg based strategy based on protecting groups
- Lecture 25 - Fg based strategy
- Lecture 26 - Protecting group based strategic disconnection
- Lecture 27 - Fg group based strategy
- Lecture 28 - Fg based strategy
- Lecture 29 - Fg based strategies

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- Lecture 30 - Fg based strategy
- Lecture 31 - Fg based strategy
- Lecture 32 - Fg based strategy
- Lecture 33 - Starting material (SM) based strategy
- Lecture 34 - Fg/Tf/SM based strategies
- Lecture 35 - Fg/Tf/SM based strategies
- Lecture 36 - Fg/Tf/SM based strategies
- Lecture 37 - Fg based strategies
- Lecture 38 - Fg based strategies in combination with SM and Tf
- Lecture 39 - Fg/SM/Tf based combined strategies
- Lecture 40 - Fg/SM/Tf based combined strategies
- Lecture 41 - Fg based strategies
- Lecture 42 - Fg based strategies
- Lecture 43 - Symmetry based strategy
- Lecture 44 - Symmetry based strategies
- Lecture 45 - Symmetry based strategies
- Lecture 46 - Symmetry based strategy
- Lecture 47 - Symmetry based strategies
- Lecture 48 - Symmetry based strategies
- Lecture 49 - Topological based strategies
- Lecture 50 - Topological strategies
- Lecture 51 - Topological strategies
- Lecture 52 - Stereochemical strategies
- Lecture 53 - Stereochemical strategies
- Lecture 54 - Stereochemical strategies
- Lecture 55 - Stereochemical Strategies
- Lecture 56 - Stereochemical strategies
- Lecture 57 - Stereochemical strategies
- Lecture 58 - Stereochemical strategies
- Lecture 59 - Synthon concept revisited
- Lecture 60 - Concluding remarks

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Introduction to Molecular Thermodynamics

Subject Co-ordinator - Prof. Srabani Taraphder

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Review of Classical Thermodynamics - Part I
- Lecture 2 - Review of Classical Thermodynamics - Part II
- Lecture 3 - Thermodynamic potentials - Part 1
- Lecture 4 - Thermodynamic potentials - Part 2
- Lecture 5 - Microstates of a system
- Lecture 6 - Microstates of a System (Continued...)
- Lecture 7 - Microstates of a system (Continued...)
- Lecture 8 - Microstates of a system (Continued...)
- Lecture 9 - Microstates of a system
- Lecture 10 - Microstates of a system
- Lecture 11 - Microstates of a system (Continued...)
- Lecture 12 - Microstates of a system (Continued...)
- Lecture 13 - Microstates of a System (Continued...)
- Lecture 14 - Fundamentals of Statistical Mechanics
- Lecture 15 - Statistical Ensembles
- Lecture 16 - Microstates of a system
- Lecture 17 - Canonical ensemble - Part I
- Lecture 18 - Canonical Ensemble - Part I (Continued...)
- Lecture 19 - Canonical Ensemble - Part II
- Lecture 20 - Canonical Ensemble - Part III
- Lecture 21 - Ideal gas
- Lecture 22 - Ideal gases (Continued...)
- Lecture 23 - Ideal gases (Continued...)
- Lecture 24 - Ideal gases (Continued...)
- Lecture 25 - Statistical thermodynamics of ideal gases (Continued...)
- Lecture 26 - Statistical Thermodynamics of ideal gases (Continued...)
- Lecture 27 - Statistical thermodynamics of ideal gases (Continued...)
- Lecture 28 - Statistical thermodynamics of ideal gases (Continued...)
- Lecture 29 - Statistical thermodynamics of ideal gases (Continued...)

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- Lecture 30 - Statistical thermodynamics of diatomic ideal gases
- Lecture 31 - Statistical thermodynamics of ideal gas
- Lecture 32 - Chemical reaction equilibrium
- Lecture 33 - Specific heat of solids
- Lecture 34 - Application of Molecular Thermodynamics
- Lecture 35 - Introduction to classical statistical mechanics
- Lecture 36 - Introduction to classical statistical mechanics (Continued...)
- Lecture 37 - Classical Statistical Mechanics
- Lecture 38 - Classical Statistical Mechanics
- Lecture 39 - Classical Statistical Mechanics
- Lecture 40 - Rate of Chemical Reaction

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Molecules in Motion

Subject Co-ordinator - Prof. Amita Pathak Mahanty

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Kinetic theory of gases
Lecture 2 - Kinetic theory of gases (Continued...)
Lecture 3 - Kinetic theory of gases (Continued...)
Lecture 4 - Kinetic theory of gases (Continued...)
Lecture 5 - Kinetic theory of gases (Continued...)
Lecture 6 - Kinetic theory of gases (Continued...)
Lecture 7 - Kinetic theory of gases (Continued...)
Lecture 8 - Kinetic theory of gases (Continued...)
Lecture 9 - Kinetic theory of gases (Continued...)
Lecture 10 - Kinetic theory of gases (Continued...)
Lecture 11 - Transport properties
Lecture 12 - Transport properties (Continued...)
Lecture 13 - Transport properties of gases
Lecture 14 - Molecular motion in Liquids
Lecture 15 - Molecular motion in Liquids (Continued...)
Lecture 16 - Molecular motion in Liquids (Continued...)
Lecture 17 - Molecular motion in Liquids (Continued...)
Lecture 18 - Molecular motion in Liquids (Continued...)
Lecture 19 - Molecular motion in Liquids (Continued...)
Lecture 20 - Molecular motion in Liquids (Continued...)
Lecture 21 - Molecular motion in Liquids (Continued...)
Lecture 22 - Molecular motion in Liquids (Continued...)
Lecture 23 - Molecular motion in Liquids (Continued...)
Lecture 24 - Molecular motion in Liquids (Continued...)
Lecture 25 - Molecular motion in Liquids (Continued...)
Lecture 26 - Molecular motion in Liquids (Continued...)
Lecture 27 - Molecular motion in Liquids (Continued...)
Lecture 28 - Molecular motion in Liquids (Continued...)
Lecture 29 - Molecular motion in Liquids (Continued...)

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- Lecture 30 - Molecular motion in Liquids (Continued...)
- Lecture 31 - Molecular motion in Liquids (Continued...)
- Lecture 32 - Molecular motion in Liquids (Continued...)
- Lecture 33 - Molecular motion in Liquids (Continued...)
- Lecture 34 - Molecular motion in Liquids (Continued...)
- Lecture 35 - Molecular motion in Liquids (Continued...)
- Lecture 36 - Molecular motion in Liquids (Continued...)
- Lecture 37 - Molecular motion in Liquids (Continued...)
- Lecture 38 - Molecular motion in gases
- Lecture 39 - Molecular motion in gases
- Lecture 40 - Molecular motion in gases

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NPTEL Video Course - Chemistry and Biochemistry - Principles and Application of Electron Paramagnetic Resonance

Subject Co-ordinator - Prof. Ranjan Das

Co-ordinating Institute - TIFR

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

- Lecture 1 - Remembering the Masters
- Lecture 2 - Introduction to EPR spectroscopy
- Lecture 3 - Electron-Nuclear Hyperfine Interaction - I
- Lecture 4 - Electron-Nuclear Hyperfine Interaction - II
- Lecture 5 - Magnetic Moment in Magnetic Field - I
- Lecture 6 - Magnetic Moment in Magnetic Field - II
- Lecture 7 - EPR Instrumentations - I
- Lecture 8 - EPR Instrumentations - II
- Lecture 9 - EPR Instrumentations - III
- Lecture 10 - EPR Instrumentations - IV
- Lecture 11 - Quantum Mechanical Description of EPR - I
- Lecture 12 - Quantum Mechanical Description of EPR - II
- Lecture 13 - Introduction to Spin Relaxation
- Lecture 14 - Theory of First-order EPR Spectra - I
- Lecture 15 - Theory of First-order EPR Spectra - II
- Lecture 16 - How to Analyse First-order EPR Spectra
- Lecture 17 - How to Record EPR Spectra
- Lecture 18 - Second-order Effects on EPR Spectra
- Lecture 19 - Photochemistry and EPR Spectroscopy
- Lecture 20 - Electron Spin Polarisation - I
- Lecture 21 - Electron Spin Polarisation - II
- Lecture 22 - Anisotropic Interactions in EPR Spectroscopy
- Lecture 23 - Theoretical Basis of isotropic Hyperfine Coupling
- Lecture 24 - Spin Relaxation and Bloch Equations - I
- Lecture 25 - Spin Relaxation and Bloch Equations - II

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemistry-I

Subject Co-ordinator - Prof. K. Mangala Sunder

Co-ordinating Institute - IIT - Madras

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

Lecture 1

Lecture 2

Lecture 3 - Part I

Lecture 3 - Part II

Lecture 4 - Part I

Lecture 4 - Part II

Lecture 4 - Part III

Lecture 5 - Part I

Lecture 5 - Part II

Lecture 5 - Part III

Lecture 5 - Part IV

Lecture 5 - Part V

Lecture 6 - Part I

Lecture 6 - Part II

Lecture 6 - Part III

Lecture 6 - Part IV

Lecture 7 - Part I

Lecture 7 - Part II

Lecture 8 - Part I

Lecture 8 - Part II

Lecture 8 - Part III

Lecture 9 - Part I

Lecture 9 - Part II

Lecture 9 - Part III

Lecture 10

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemistry-II

Subject Co-ordinator - Prof. K. Mangala Sunder

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Electromagnetic radiation
- Lecture 2 - Interaction of radiation with matter
- Lecture 3 - Introduction to chemical applications
- Lecture 4 - Analysis of spectra
- Lecture 5 - Radiation densities and Einstein's semi classical model
- Lecture 6 - Introduction to quantum mechanics - I
- Lecture 7 - Introduction to quantum mechanics - II
- Lecture 8 - Born-Oppenheimer approximation
- Lecture 9 - Beer-Lambert law
- Lecture 10 - Diatomic Vibration Spectra Hermonic Model
- Lecture 11 - Diatomic Vibration Morse Oscillator Model
- Lecture 12 - Normal Vibrational modes Triatomic molecules
- Lecture 13 - Normal Vibrational modes Polyatomic molecules
- Lecture 14 - Vibrational Polyatomic Infrared Spectroscopy Local Modes and Group Frequencies
- Lecture 15 - Microwave spectra of di-atomic molecules
- Lecture 16 - Diatomic Molecules Microwave Energies and Transitions
- Lecture 17 - Methodology of solving problems
- Lecture 18 - Rotational and Vibrational Line Intensities
- Lecture 19 - Microwave Spectra of Polyatomic molecules (Symmetric tops)
- Lecture 20 - Video Tutorial 2
- Lecture 21 - Video Tutorial 2
- Lecture 22 - Introduction to Tensors
- Lecture 23 - Polarizability Tensor
- Lecture 24 - Introduction to Rotational Raman Spectra.
- Lecture 25 - Review of basic concepts in Molecular Spectroscopy
- Lecture 26 - Review of Microwave Spectroscopy
- Lecture 27 - Review of Elementary Vibrational Spectroscopy

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Application of Spectroscopic Methods in Molecular Structure

Subject Co-ordinator - Prof. S. Sankararaman

Co-ordinating Institute - IIT - Madras

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

Module 1

Module 2

Module 3

Module 4

Module 5

Module 6

Module 7

Module 8

Module 9

Module 10

Module 11

Module 12

Module 13

Module 14

Module 15

Module 16

Module 17

Module 18

Module 19

Module 20

Module 21

Module 22

Module 23

Module 24

Module 25

Module 26

Module 27

Module 28

Module 29

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Module 30
Module 31
Module 32
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Module 36

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NPTel Video Course - Chemistry and Biochemistry - NOC:Pericyclic Reactions and Organic Photochemistry

Subject Co-ordinator - Prof. S. Sankararaman

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Activation of chemical reactions. Thermal and photochemical methods
- Lecture 2 - MOs of polyene and their symmetry properties and methods of analyzing pericyclic reactions
- Lecture 3 - Introduction to electrocyclic reactions and Woodward Hoffmann rules
- Lecture 4 - Electrocyclic reactions \hat{A} examples of 3, 4 and 5 membered ring systems (2e and 4e systems)
- Lecture 5 - Electrocyclic reactions \hat{A} examples of 6 and larger ring systems (6e and more)
- Lecture 6 - Tutorial session 1
- Lecture 7 - Cycloaddition reactions - Introduction and Woodward Hoffmann rules - [2+2] cycloadditions
- Lecture 8 - Cycloaddition reactions \hat{A} ketene cycloadditions
- Lecture 9 - Cycloaddition reactions \hat{A} Diels-Alder reaction - Woodward Hoffmann rule - Regiochemistry and Stereochemistry
- Lecture 10 - Diels Alder reaction - synthetic applications
- Lecture 11 - Diels Alder reaction continued - Hetero diene and dienophile - Lewis acid mediated - asymmetric
- Lecture 12 - 1,3-Dipolar cycloaddition reactions
- Lecture 13 - 1,3-Dipolar cycloaddition reactions (Continued...)
- Lecture 14 - [4pi+4pi], [4pi+6pi] and higher order cycloaddition reactions
- Lecture 15 - Tutorial session 2 on cycloaddition reactions
- Lecture 16 - Pericyclic reactions \hat{A} Sigmatropic rearrangements \hat{A} Introduction and [1,3] migrations
- Lecture 17 - Pericyclic reactions \hat{A} Sigmatropic rearrangements (Continued...) [1,5] H and C migrations and Cope rearrangement
- Lecture 18 - Pericyclic reactions \hat{A} Sigmatropic rearrangements (Continued...) oxy Cope and Claisen Rearrangement
- Lecture 19 - Pericyclic reactions \hat{A} Sigmatropic rearrangements (Continued...)
- Lecture 20 - Pericyclic reactions \hat{A} Sigmatropic rearrangements (Continued...) [2,3] sigmatropic shifts and H-shift
- Lecture 21 - Pericyclic reactions \hat{A} Sigmatropic rearrangements (Continued...) Wittig rearrangement and higher order
- Lecture 22 - Pericyclic reactions \hat{A} Chelotropic reactions - introduction, SO₂ extrusion reactions
- Lecture 23 - Pericyclic reactions \hat{A} Tutorial session 3 - Problems on sigmatropic reactions
- Lecture 24 - Chelotropic reactions 2
- Lecture 25 - The Ene Reaction
- Lecture 26 - Tutorial session - 4
- Lecture 27 - Introduction to organic photochemistry
- Lecture 28 - Photochemistry of alkenes cis-trans isomerization
- Lecture 29 - Photochemistry of alkenes (Continued...)

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- Lecture 30 - Photochemistry of carbonyl compounds, Norrish type 1 and 2 reactions
- Lecture 31 - Photochemistry of carbonyl compounds, enone and dienone photochemistry
- Lecture 32 - Photochemistry of Nitrogen compounds
- Lecture 33 - Photochemistry of aromatic compounds
- Lecture 34 - Photoinduced electron transfer reactions

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemistry I:Introduction To Quantum Chemistry And Molec

Subject Co-ordinator - Prof. K. Mangala Sunder

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Lecture 1 - Historical context and experiments: Introducing the Schrödinger equation
Lecture 2 - Lecture 2 - Bohr's atom, De Broglie Matter Waves and Schrodinger equation
Lecture 3 - Lecture 3 - Electromagnetic Radiation
Lecture 4 - Lecture 4 - Interaction of Radiation with Matter
Lecture 5 - Lecture 5 - Molecular Spectroscopy
Lecture 6 - Lecture 6 - Elementary Mathematical Functions I
Lecture 7 - Lecture 7 - Review of Properties of Elementary Functions II
Lecture 8 - Lecture 8 - Time Dependent Schrödinger Equation & Time Independent Schrödinger Equation
Lecture 9 - Lecture 9 - Schrödinger Equation Particle in a One-dimensional Box : Part I
Lecture 10 - Lecture 10 - Schrödinger Equation Particle in a One-dimensional Box : Part II
Lecture 11 - Lecture 11 - Schrödinger Equation Particle in Two-dimensional Box : Part I
Lecture 12 - Lecture 12 - Particle in Two-dimensional Box : Part II Uncertainty Principle
Lecture 13 - Lecture 13 - Particle in Two-dimensional Box : Part III Expectation Values
Lecture 14 - Lecture 14 - The Quantum Mechanics of Hydrogen Atom - Part I
Lecture 15 - Lecture 15 - The Quantum Mechanics of Hydrogen Atom - Part II
Lecture 16 - Lecture 16 - The Quantum Mechanics of Hydrogen Atom - Part III
Lecture 17 - Lecture 17 - The Quantum Mechanics of Hydrogen Atom - Part IV
Lecture 18 - Lecture 18 - The Quantum Mechanics of Hydrogen Atom - Part V
Lecture 19 - Lecture 19A - Assignment 1 Solution/Hints
Lecture 20 - Lecture 19B - Assignment 1 Solution/Hints
Lecture 21 - Lecture 19C - Assignment 1 Solution/Hints
Lecture 22 - Lecture 19D - Assignment 1 Solution/Hints
Lecture 23 - Lecture 19E - Assignment 1 Solution/Hints
Lecture 24 - Lecture 20 Harmonic Oscillator Model - Part I
Lecture 25 - Lecture 21 Harmonic Oscillator Model - Part II
Lecture 26 - Lecture 22 Harmonic Oscillator Model - Part III
Lecture 27 - Lecture 23 Harmonic Oscillator Model - Part IV
Lecture 28 - Lecture 24 Particle on a Ring - Part I
Lecture 29 - Lecture 25 Particle on a Ring - Part II

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- Lecture 30 - Lecture 26 - Heisenberg's Uncertainty Relation
- Lecture 31 - Lecture 27A - Operators, Commutators, Eigenvalues and Eigenvectors
- Lecture 32 - Lecture 27B - Operators, Commutators, Eigenvalues and Eigenvectors
- Lecture 33 - Lecture 28 - Introduction to Chemical Applications
- Lecture 34 - Lecture 29 - Radiation Densities and Einstein's Semiclassical model
- Lecture 35 - Lecture 30 - Born Oppenheimer Approximation
- Lecture 36 - Lecture 31 - Beer Lambert Law
- Lecture 37 - Lecture 32 - Diatomic Vibrational Spectra Harmonic Model
- Lecture 38 - Lecture 33 - Diatomic Vibration Morse Oscillator Model
- Lecture 39 - Lecture 34 - Molecular Vibrations in Polyatomic Molecules - Qualitative Account
- Lecture 40 - Lecture 35 - Polyatomic Vibrations - Illustrative examples of normal vibrations

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Introduction to Chemical Thermodynamics and Kinetics

Subject Co-ordinator - Prof.Arijit Kumar De

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to Chemical Thermodynamics and Kinetics

Lecture 2 - Properties of gases - Part 1

Lecture 3 - Properties of gases - Part 2

Lecture 4 - Introduction - Part 1

Lecture 5 - Introduction - Part 2

Lecture 6 - First law - Part 1

Lecture 7 - First law - Part 2

Lecture 8 - First law - Part 3

Lecture 9 - First law - Part 4

Lecture 10 - First law - Part 5

Lecture 11 - Second law - Part 1

Lecture 12 - Second law - Part 2

Lecture 13 - Spontaneity and equilibrium - Part 1

Lecture 14 - Spontaneity and equilibrium - Part 2

Lecture 15 - Spontaneity and equilibrium - Part 3

Lecture 16 - Phase equilibrium - Part 1

Lecture 17 - Phase equilibrium - Part 2

Lecture 18 - Phase equilibrium - Part 3

Lecture 19 - Mixtures - Part 1

Lecture 20 - Mixtures - Part 2

Lecture 21 - Chemical Equilibrium - Part 1

Lecture 22 - Chemical Equilibrium - Part 2

Lecture 23 - Chemical Equilibrium - Part 3

Lecture 24 - Chemical Equilibrium - Part 4

Lecture 25 - Chemical Equilibrium - Part 5

Lecture 26 - Electrochemistry

Lecture 27 - Surfaces and interfaces

Lecture 28 - Chemical Kinetics

Lecture 29 - Chemical Kinetics

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

- Lecture 30 - Chemical Kinetics
- Lecture 31 - Chemical Kinetics
- Lecture 32 - Chemical Kinetics
- Lecture 33 - Chemical Kinetics
- Lecture 34 - Chemical Kinetics
- Lecture 35 - Chemical Kinetics
- Lecture 36 - Chemical Kinetics
- Lecture 37 - Chemical Kinetics
- Lecture 38 - Reaction dynamics - Part 1
- Lecture 39 - Reaction dynamics - Part 2
- Lecture 40 - Reaction dynamics - Part 3
- Lecture 41 - Reaction dynamics - Part 4
- Lecture 42 - Reaction dynamics - Part 5
- Lecture 43 - Reaction dynamics - Part 6
- Lecture 44 - Reaction dynamics - Part 7
- Lecture 45 - Live Session

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

NPTel Video Course - Chemistry and Biochemistry - NOC:Chemical Crystallography

Subject Co-ordinator - Prof.Angshuman Roy Choudhury

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to X-Ray Crystallography
- Lecture 2 - Sources of X-Rays, Crystal Systems and Bravais lattices
- Lecture 3 - Crystallographic Symmetries
- Lecture 4 - Equivalent Points and 1D Lattices
- Lecture 5 - 5 Fold Symmetry and 2D Lattices
- Lecture 6 - 2D Space Lattices
- Lecture 7 - Crystallographic Point Groups
- Lecture 8 - Stereographic Projections of Point Groups
- Lecture 9 - Understanding of Crystallographic Space Groups
- Lecture 10 - 2D Projection of Space Groups
- Lecture 11 - Tutorial - 01
- Lecture 12 - 3D Space Groups and Equivalent Points
- Lecture 13 - Obtaining Equivalent Points by Shifting of Origin
- Lecture 14 - Representation of Orthorhombic and Tetragonal Space Groups
- Lecture 15 - Miller Indices for Crystallographic Directions and Planes
- Lecture 16 - Miller Indices and Planar Densities
- Lecture 17 - Tutorial - 02
- Lecture 18 - Cubic Structures and atomic packing factors
- Lecture 19 - Ceramic Structures
- Lecture 20 - Theory of X-Ray Diffraction
- Lecture 21 - Tutorial - 03
- Lecture 22 - Origin of Reciprocal Lattice
- Lecture 23 - Bragg's Law in Reciprocal Lattice and Origin of Systematic Absences
- Lecture 24 - Systematic Absences and Crystallisation Methods
- Lecture 25 - Special Method of Crystallisation
- Lecture 26 - Tutorial
- Lecture 27 - Single Crystal X-Ray Diffraction Data Collection
- Lecture 28 - Diffractometers
- Lecture 29 - Diffractometers and Detectors

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

- Lecture 30 - Laue's and Bragg's Analysis
- Lecture 31 - Experimental Methods and Theoretical Understanding of X-Ray Diffraction
- Lecture 32 - Derivation of Friedel's Law from Structure Factor by Vector Space Diagram
- Lecture 33 - Structure Factor and Electron Density
- Lecture 34 - Systematic Absence Conditions from Special Structure Factor Expression
- Lecture 35 - Structure Refinement
- Lecture 36 - Single Crystal X-Ray Diffractometer
- Lecture 37 - Understanding the X-Ray Data
- Lecture 38 - Data Handling (Solution and Refinement) using Various Crystallographic Packages
- Lecture 39 - Structure Solution using Apex II (Bruker Diffractometer)
- Lecture 40 - Direct Methods - Part 1
- Lecture 41 - Direct Methods - Part 2
- Lecture 42 - Disorder Treatment using Olex 2
- Lecture 43 - Cambridge Structure Database and its Application
- Lecture 44 - Data Reduction - Absorption Correction
- Lecture 45 - Data Reduction - Lorentz and Polarization Correction
- Lecture 46 - Data Reduction - Scale and Temperature Factor
- Lecture 47 - Identification from Intensity Statistics the Correct Crystal System and Presence of Inversion Centres
- Lecture 48 - Identification from Intensity Statistics the presence of 2 fold axis in Lattice
- Lecture 49 - Phase Problem
- Lecture 50 - Direct Methods - Part 1
- Lecture 51 - Direct Methods - Part 2
- Lecture 52 - Sigma 1 and Triplet Relationship
- Lecture 53 - Patterson Method
- Lecture 54 - Powder X-Ray Diffractometer - Theory
- Lecture 55 - Powder X-Ray Diffractometer - Lab
- Lecture 56 - Polymorphs
- Lecture 57 - Polymorphs
- Lecture 58 - Review of Reciprocal Lattice
- Lecture 59 - Review of Reciprocal Lattice
- Lecture 60 - Review of Reciprocal Lattice and Bragg's Law in Reciprocal Lattice
- Lecture 61 - Ewald's Sphere and Limiting Sphere
- Lecture 62 - Origin of/Introduction to Systematic absences

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Advanced Chemical Thermodynamics and Kinetics

Subject Co-ordinator - Prof.Arijit Kumar De

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Review of Classical Thermodynamics - 1
Lecture 2 - Review of Classical Thermodynamics - 2
Lecture 3 - Review of Classical Thermodynamics - 3
Lecture 4 - Review of Classical Thermodynamics - 4
Lecture 5 - Review of Classical Thermodynamics - 5
Lecture 6 - Molecular Interactions - 1
Lecture 7 - Molecular Interactions - 2
Lecture 8 - Molecular Interactions - 3
Lecture 9 - Molecular Interactions - 4
Lecture 10 - Molecular Interactions - 5
Lecture 11 - Transport Phenomena - 1
Lecture 12 - Transport Phenomena - 2
Lecture 13 - Transport Phenomena - 3
Lecture 14 - Review of Chemical Kinetics - 1
Lecture 15 - Review of Chemical Kinetics - 2
Lecture 16 - Review of Chemical Kinetics - 3
Lecture 17 - Review of Chemical Kinetics - 4
Lecture 18 - Review of Chemical Kinetics - 5
Lecture 19 - Advanced Topic in Chemical Kinetics - 1
Lecture 20 - Advanced Topic in Chemical Kinetics - 2
Lecture 21 - Advanced Topic in Chemical Kinetics - 3
Lecture 22 - Introduction to statistical thermodynamics - 1
Lecture 23 - Introduction to statistical thermodynamics - 2
Lecture 24 - Introduction to statistical thermodynamics - 3
Lecture 25 - Introduction to bimolecular reaction dynamics - 1
Lecture 26 - Introduction to bimolecular reaction dynamics - 2
Lecture 27 - Introduction to bimolecular reaction dynamics - 3
Lecture 28 - Introduction to bimolecular reaction dynamics - 4
Lecture 29 - Unimolecular reaction - 1

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- Lecture 30 - Unimolecular reaction - 2
- Lecture 31 - Introduction to solution phase reactions dynamics - 1
- Lecture 32 - Introduction to solution phase reactions dynamics - 2
- Lecture 33 - Introduction to solution phase reactions dynamics - 3
- Lecture 34 - Introduction to solution phase reactions dynamics - 4
- Lecture 35 - Introduction to solution phase reactions dynamics - 5
- Lecture 36 - Non-ideal solutions, Activity of ions (Debye-Huckel theory) - 1
- Lecture 37 - Non-ideal solutions, Activity of ions (Debye-Huckel theory) - 2
- Lecture 38 - Electrochemistry
- Lecture 39 - Electrochemistry
- Lecture 40 - Reaction Dynamics
- Lecture 41 - Chemical Kinetics
- Lecture 42 - Transport Phenomena
- Lecture 43 - Equilibrium constant using partition method
- Lecture 44 - Photochemistry

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NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemistry: Atomic Structure and Chemical Bonding

Subject Co-ordinator - Prof. K. Mangala Sunder

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Welcome
- Lecture 2 - Elementary Mathematical Functions Used in Our Course
- Lecture 3 - Schrodinger Equation
- Lecture 4 - Particle in a One dimensional Box
- Lecture 5 - Elementary Mathematics
- Lecture 6 - Elementary Mathematics
- Lecture 7 - Elementary Mathematics
- Lecture 8 - Elementary Mathematics
- Lecture 9 - Particle in a Two Dimensional Box (Infinite Barrier)
- Lecture 10 - Heisenberg's Uncertainty Principle
- Lecture 11 - Expectation Values and Postulates in Quantum Mechanics
- Lecture 12 - Problems and Solutions for Particle in One and Two Dimensional Boxes
- Lecture 13 - Linear Vector Spaces
- Lecture 14 - Linear Vector Spaces and Operators
- Lecture 15 - Simple Harmonic Oscillator
- Lecture 16 - Simple Harmonic Oscillator
- Lecture 17 - Simple Harmonic Oscillator
- Lecture 18 - Simple Harmonic Oscillator
- Lecture 19 - Particle on a Ring
- Lecture 20 - Particle on a Ring
- Lecture 21 - Coordinate Transformation
- Lecture 22 - Problems and Solutions for Harmonic Oscillator
- Lecture 23 - Hydrogen Atom
- Lecture 24 - Hydrogen Atom
- Lecture 25 - Hydrogen Atom
- Lecture 26 - Hydrogen Atom
- Lecture 27 - Hydrogen Atom
- Lecture 28 - Power Series Method for Differential Equation - I
- Lecture 29 - Hermite's Differential Equation

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

- Lecture 30 - Legendre and Associated Legendre Equation
- Lecture 31 - Born-Oppenheimer Approximation
- Lecture 32 - Introduction to Angular Momentum
- Lecture 33 - Spin \hat{S} Angular Momentum
- Lecture 34 - Spin Angular Momentum and Coupling of Two Spin-1/2 Angular Momenta
- Lecture 35 - Coupling of Two Angular Momenta
- Lecture 36 - Video Tutorial for Hermite polynomials and hydrogen atom - Part 1
- Lecture 37 - Video Tutorials - Part 2
- Lecture 38 - Variational Principle in Quantum Chemistry
- Lecture 39 - Introduction to Variational Principle in Quantum Chemistry
- Lecture 40 - Variational Method
- Lecture 41 - Hydrogen Molecule Ion
- Lecture 42 - Hydrogen Molecule Ion
- Lecture 43 - Hydrogen Molecule
- Lecture 44 - Hydrogen Molecule
- Lecture 45 - Video Tutorials on Angular Momentum (Orbital and Spin) and Variational Method - Part 1
- Lecture 46 - Video Tutorials on Angular Momentum (Orbital and Spin) and Variational Method - Part 2
- Lecture 47 - Introduction to Quantum Mechanical Perturbation Theory
- Lecture 48 - First Order Time Independent perturbation Theory for Non-Degenerate states
- Lecture 49 - First and Second Order Time Independent Perturbation Theory for Non-Degenerate States
- Lecture 50 - First and Second Order Time Independent Perturbation Theory
- Lecture 51 - Time Independent Perturbation Theory for Degenerate States
- Lecture 52 - General MO method for Homonuclear Diatomic Molecules
- Lecture 53 - General MO method for Heteronuclear Diatomic Molecules
- Lecture 54 - Introduction to Hybridization and Valence Bond for Polyatomic Molecules
- Lecture 55 - Hückel Molecular Orbital Theory - I
- Lecture 56 - Hückel Molecular Orbital Theory - II

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

NPTEL Video Course - Chemistry and Biochemistry - Essentials in Immunology

Subject Co-ordinator - Prof. Anjali Karande, Dr. Dipankar Nandi, Dr. R. Manjunath

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Introduction to the immune system
- Lecture 2 - Cells and Organs of the immune system - Part 1
- Lecture 3 - Cells and Organs of the immune system - Part 2
- Lecture 4 - Cells and Organs of the immune system - Part 3
- Lecture 5 - Innate immunity - Part 1
- Lecture 6 - Innate immunity - Part 2
- Lecture 7 - Development and differentiation of B cells - Part 1
- Lecture 8 - Signaling in B cells
- Lecture 9 - Organization of immunoglobulin genes and Mechanism of immunoglobulin gene rearrangement
- Lecture 10 - Generation of antibody diversity
- Lecture 11 - Immunoglobulin class switching Regulation of Immunoglobulin gene regulation
- Lecture 12 - Structures and functions of Immunoglobulinâ s
- Lecture 13 - The three complement pathways
- Lecture 14 - Hypersensitivity type 1
- Lecture 15 - Hypersensitivity types 2, 3 ,4 and Autoimmunity
- Lecture 16 - Autoimmunity Autoimmuno-deficiencies f the B cells
- Lecture 17 - Autoimmuno-deficiencies f the B cells
- Lecture 18 - Cancer
- Lecture 19 - The major histocompatibility complex - Part 1
- Lecture 20 - The major histocompatibility complex - Part 2
- Lecture 21 - The major histocompatibility complex - Part 3
- Lecture 22 - The Major Histocompatibility Complex
- Lecture 23 - The Major Histocompatibility Complex
- Lecture 24 - The Major Histocompatibility Complex
- Lecture 25 - T cell receptors
- Lecture 26 - T cell Activation
- Lecture 27 - T cell Activation / Differentiation
- Lecture 28 - T cell synapse, motility and subsets
- Lecture 29 - T cell survival

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- Lecture 30 - Cytokines - Part 1
- Lecture 31 - Cytokines - Part 2
- Lecture 32 - Autoimmunity
- Lecture 33 - Immunodeficiency
- Lecture 34 - Host response mechanisms during infectious diseases - Part 1
- Lecture 35 - Host response mechanisms during infectious diseases - Part 2
- Lecture 36 - Transplantation immunology
- Lecture 37 - Vaccines
- Lecture 38 - Antigens and Immunogens
- Lecture 39 - Synthetic vaccines
- Lecture 40 - Evolution of the immune system

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NPTEL Video Course - Chemistry and Biochemistry - Eukaryotic Gene Expression - basics and benefits

Subject Co-ordinator - Prof. P.N. Rangarajan

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Eukaryotic RNA polymerases and basal transcription factors
- Lecture 2 - Diversity in core promoter elements
- Lecture 3 - Diversity in general transcription factors
- Lecture 4 - Proximal & Distal Promoter Elements, Enhancers and Silencers, Gene-specific Regulators
- Lecture 5 - Transcription factors - DNA binding domains
- Lecture 6 - Transcription factors - Transcription activation domain
- Lecture 7 - Role of chromatin in eukaryotic gene regulation
- Lecture 8 - Role of histones in eukaryotic gene regulation
- Lecture 9 - Role of DNA methylation in eukaryotic gene regulation
- Lecture 10 - Chromatin remodelling & gene regulation
- Lecture 11 - mRNA processing - Role of RNA Pol II in mRNA capping and mRNA splicing
- Lecture 12 - mRNA processing - Role of RNA Pol II in polyadenylation & mRNA editing
- Lecture 13 - Regulation of RNA Pol I transcription
- Lecture 14 - Regulation of RNA Pol III transcription
- Lecture 15 - Signal Transduction Pathways - Introduction
- Lecture 16 - Regulation of gene expression by cyclicAMP
- Lecture 17 - Regulation of gene expression by second messengers other than cAMP
- Lecture 18 - Regulation of gene expression by Protein Kinase C
- Lecture 19 - Regulation of gene expression by Growth factors
- Lecture 20 - Regulation of gene expression by cytokines
- Lecture 21 - Regulation of gene expression by steroid hormones
- Lecture 22 - Regulation of gene expression by type II nuclear receptors
- Lecture 23 - Mechanism of transcriptional activation by nuclear receptors
- Lecture 24 - Gene Regulation during Drosophila Development
- Lecture 25 - Signal transduction pathways involved in embryonic development
- Lecture 26 - Homeotic genes
- Lecture 27 - Epigenetic regulation of gene expression during development
- Lecture 28 - Embryonic stem cells and Transcription factor-mediated epigenetic reprogramming
- Lecture 29 - Cloning and Expression vectors

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- Lecture 30 - Eukaryotic protein expression systems - I
- Lecture 31 - Eukaryotic protein expression systems - II
- Lecture 32 - Eukaryotic protein expression systems - III
- Lecture 33 - Human Gene Therapy
- Lecture 34 - DNA vaccines
- Lecture 35 - Transgenic animals
- Lecture 36 - Transgenic plants
- Lecture 37 - Knockout mic
- Lecture 38 - Regulation of Eukaryotic Gene Expression by Small RNAs (RNA Interference, RNAi)
- Lecture 39 - Genomics & Proteomics
- Lecture 40 - Metabolic Engineering & Synthetic Biology

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

NPTEL Video Course - Chemistry and Biochemistry - Introductory Quantum Chemistry

Subject Co-ordinator - Prof. K.L. Sebastian

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Wave Particle Duality

Lecture 2 - Standing Waves

Lecture 3 - Path Integrals and Schrodinger Equation

Lecture 4 - Postulates - Part 1

Lecture 5 - Postulates - Part 2

Lecture 6 - Postulates - Part 3

Lecture 7 - Separating Variables and Particle in a Box - Part 1

Lecture 8 - Particle in a box - Part 2

Lecture 9 - Particle in a box - Part 3

Lecture 10 - Particle in a box-time dependent states-Expectations values and time dependent states

Lecture 11 - Particle in a 3 dimensional box

Lecture 12 - Particle in a well of finite depth

Lecture 13 - Finite well, Delta and Step Functions

Lecture 14 - Finite well (Continued...)

Lecture 15 - Tunneling - Part 1

Lecture 16 - Tunneling - Part 2

Lecture 17 - Schrodinger equation for Harmonic Oscillator

Lecture 18 - Harmonic Oscillator - The Series Solution

Lecture 19 - Harmonic Oscillator - Generating function

Lecture 20 - Harmonic Oscillator - Orthogonality of Eigenfunctions

Lecture 21 - Hydrogen Atom

Lecture 22 - Hydrogen Atom

Lecture 23 - Hydrogen atom continued

Lecture 24 - Hydrogen atom

Lecture 25 - Finding $R(r)$

Lecture 26 - Atomic Orbitals - Part 1

Lecture 27 - Atomic Orbitals - Part 2

Lecture 28 - Atomic Orbitals - Part 3

Lecture 29 - Atomic Orbitals - Part 4 and Hermitian Operators

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- Lecture 30 - Measurement, Uncertainty Principle
- Lecture 31 - Generalized Uncertainty Principle
- Lecture 32 - Generalized Uncertainty Principle (Continued...)
- Lecture 33 - Angular Momentum
- Lecture 34 - Angular Momentum (Continued...)
- Lecture 35 - Angular Momentum (Continued...) and Spin
- Lecture 36 - Perturbation Theory
- Lecture 37 - Perturbation Theory (Continued...)
- Lecture 38 - Variation Method - Introduction
- Lecture 39 - Variation Method - Proof and Illustration
- Lecture 40 - He atom wave function with spin included - Pauli's principle
- Lecture 41 - Hydrogen Molecular ion - Linear variation method
- Lecture 42 - Hydrogen Molecular ion (Continued...)
- Lecture 43 - Hydrogen Molecular ion (Continued...)
- Lecture 44 - Molecular Orbitals The Hydrogen Molecule
- Lecture 45 - MO and VB theory
- Lecture 46 - MO theory of diatoms
- Lecture 47 - Di-atomics (Continued...)
- Lecture 48 - Hybridization Huckel theory
- Lecture 49 - Huckel MO Theory (Continued...)

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

NPTEL Video Course - Chemistry and Biochemistry - Introduction to Organometallic Chemistry

Subject Co-ordinator - Prof. A.G. Samuelson

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Introduction to Organometallic chemistry
- Lecture 2 - Metal carbonyl complexes
- Lecture 3 - Metal carbonyls - Part II
- Lecture 4 - Ligand substitution reactions
- Lecture 5 - Substitutes for carbonyl ligands
- Lecture 6 - Carbene complexes
- Lecture 7 - Carbene complexes (Continued...)
- Lecture 8 - Non-Carbon Ancillary ligands
- Lecture 9 - Non-Carbon Ancillary ligands (Continued...)
- Lecture 10 - Metal alkyl complexes
- Lecture 11 - Ligand Insertion Reactions
- Lecture 12 - Metal alkene complexes
- Lecture 13 - Alkynes π bonding
- Lecture 14 - Metal dihydrogen and hydrides
- Lecture 15 - Migratory Insertion reaction with alkynes
- Lecture 16 - η^m ($m=4$ dienes and $m=2n$, polyenes)
- Lecture 17 - Oxidative addition & Vaska's complex mechanism
- Lecture 18 - Reductive elimination
- Lecture 19 - Reductive Elimination mechanism
- Lecture 20 - Oxidative coupling with C-C bond formation
- Lecture 21 - Metathesis reactions
- Lecture 22 - Metal-allyls - π 3 complexes-synthesis, bonding
- Lecture 23 - Metal-allyls - η^3 complexes-fluxionality, reactivity
- Lecture 24 - C-C single bond forming reactions
- Lecture 25 - π 5 Cyclopentadienyl - complexes
- Lecture 26 - η^6 arene Metal complexes
- Lecture 27 - Half sandwich complexes
- Lecture 28 - Reactivity changes in coordinated ligands
- Lecture 29 - The isolobal analogy

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- Lecture 30 - Fluxional Properties of Organometallics
- Lecture 31 - Quantifying Steric and electronic factors
- Lecture 32 - Hydrogenation reactions
- Lecture 33 - Addition of HX to olefins
- Lecture 34 - Reactions with CO insertion
- Lecture 35 - Organometallics promoted C-X coupling
- Lecture 36 - Organometallic polymerization
- Lecture 37 - C-H activation
- Lecture 38 - Asymmetric Catalysis
- Lecture 39 - Medicinal applications of organometallic complexes
- Lecture 40 - Special Properties and Applications

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Principles and Applications of NMR Spectroscopy

Subject Co-ordinator - Prof. Hanudatta S. Atreya

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction to NMR spectroscopy

Lecture 2 - The alignment of nuclear spins in presence of magnetic field

Lecture 3 - Introduction to rotating frame

Lecture 4 - Free induction decay and Fourier transformation of FID

Lecture 5 - NMR Hardware

Lecture 6 - The concept of chemical shift

Lecture 7 - Factors that affect chemical shifts

Lecture 8 - Chemical shift referencing

Lecture 9 - J-coupling

Lecture 10 - Recap of basics

Lecture 11 - Introduction to general one dimensional NMR experiment

Lecture 12 - Practical aspects of recording a 1D NMR experiment - I

Lecture 13 - Practical aspects of recording a 1D NMR experiment - II

Lecture 14 - Practical aspects of recording a 1D NMR experiment - III

Lecture 15 - NMR Data processing

Lecture 16 - Basic aspects of 1D proton NMR analysis

Lecture 17 - Analysis of an example 1D proton spectrum

Lecture 18 - Analysis of 1D ¹H NMR spectra of molecules - I

Lecture 19 - Analysis of 1D ¹H NMR spectra of molecules - II

Lecture 20 - 1D ¹³C NMR

Lecture 21 - Why do we need 2D NMR

Lecture 22 - A qualitative explanation of how 2D NMR experiment works

Lecture 23 - Principles of 2D COSY and Total correlation spectroscopy (2D TOCSY)

Lecture 24 - 2D NOE-spectroscopy

Lecture 25 - 2D NOESY and 2D ROESY

Lecture 26 - What is heteronuclear correlation NMR spectroscopy

Lecture 27 - Sensitivity enhancement of heteronuclei via polarization transfer

Lecture 28 - Heteronuclear multiple quantum NMR spectroscopy (2D HMQC) and Heteronuclear single quantum NMR spectroscopy (2D HSQC)

Lecture 29 - Practical aspects of recording and processing 2D HMQC or HSQC

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- Lecture 30 - HMBC and its utility
- Lecture 31 - 2D HSQC TOCSY and its analysis with examples
- Lecture 32 - Structure determination of molecules by NMR
- Lecture 33 - Structure determination of peptides - I
- Lecture 34 - Structure determination of peptides - II
- Lecture 35 - Structure determination of peptides - III
- Lecture 36 - Chemical exchange
- Lecture 37 - Hydrogen or deuterium exchange
- Lecture 38 - Diffusion ordered spectroscopy DOSY I
- Lecture 39 - DOSY II
- Lecture 40 - STD NMR for drug target interactions