

## 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]

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

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

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 interactions
- 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-Entropy
- Lecture 56 - Estimation of Binding Constants in Strong to Ultratight Protein-Ligand, Interactions Using DSC
- Lecture 57 - Continuation of discussion on... Estimation of Binding Constants in Strong to Ultratight Protein-Ligand
- Lecture 58 - Thermal unfolding of protein by non-calorimetric methods, Addressing thermodynamics of the process
- Lecture 59 - Titration Calorimetry as a tool to determine thermodynamic and Kinetic parameters of enzymes
- Lecture 60 - Summary of the course on

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

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

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

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 -  $\beta$ -elimination in Sigma-Alkyl Compounds
- Lecture 13 -  $\beta$ -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<sub>F</sub> TM) Complexes
- Lecture 25 - Preparation of Transition Metal Perfluoroalkyl (R<sub>F</sub> TM) 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

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

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 - Assymetric 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 - Assymetric Suzuki Coupling Reaction
- Lecture 11 - Sonogashira Coupling Reaction
- Lecture 12 - Heck Coupling Reaction
- Lecture 13 - Assymetric 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 Lecture Topic List - Created by LinuXpert Systems, Chennai

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

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

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, H<sub>2</sub>O, Ferrocene
- Lecture 65 - MOT approach of bonding, H<sub>2</sub>O, Ferrocene
- Lecture 66 - Derivation
- Lecture 67 - Derivation
- Lecture 68 - Derivation

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

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

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Molecular Spectroscopy: A Physical Chemists Perspective

Subject Co-ordinator - Prof. Anindya Datta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Frequency Domain Spectroscopy  
Lecture 2 - Schematics of Instrumentation for FD Spectroscopy  
Lecture 3 - Sensitivity Light Collection and Signal to Noise Ratio  
Lecture 4 - Time Domain Spectroscopy  
Lecture 5 - Frequency Modulation for Fourier Transform Spectroscopy  
Lecture 6 - Rigid Rotor Model for Diatomic Molecules  
Lecture 7 - Recapitulation of Quantum Mechanics  
Lecture 8 - Conditions for Microwave Activity - I  
Lecture 9 - Conditions for Microwave Activity - II  
Lecture 10 - Microwave Spectra  
Lecture 11 - Simple Harmonic Oscillator  
Lecture 12 - Selection Rule  
Lecture 13 - High Resolution IR Spectra  
Lecture 14 - Anharmonic Oscillator and Raman Effect  
Lecture 15 - Semi Classical Treatment  
Lecture 16 - Time Dependent Perturbation Theory  
Lecture 17 - Transition Moment Integral  
Lecture 18 - Transition Probability and Natural Linewidth  
Lecture 19 - Einstein Treatment  
Lecture 20 - Relationship Between Theoretical and Experimental Quantities  
Lecture 21 - Level System  
Lecture 22 - Level System  
Lecture 23 - Laser Basic  
Lecture 24 - Applications of Laser in Spectroscopy  
Lecture 25 - Laser in Spectroscopy  
Lecture 26 - Snapshot of Bond Breaking  
Lecture 27 - Raman Effect  
Lecture 28 - Raman Spectroscopy  
Lecture 29 - Raman Spectroscopy and Beyond Dipole Approximation

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- Lecture 30 - Symmetry in Chemistry
- Lecture 31 - Symmetry Operations
- Lecture 32 - Representations Reducible and Irreducible
- Lecture 33 - Matrix Representation of Symmetry Point Group
- Lecture 34 - Group Theory
- Lecture 35 - Character Table
- Lecture 36 - Mulliken Nomenclature, 2D Irreducible Representations and Bases
- Lecture 37 - Character Tables for Different Symmetry Point Groups
- Lecture 38 - Wave Functions as Basis
- Lecture 39 - Symmetry of Atomic and Molecular Orbitals
- Lecture 40 - Polyatomic Molecules
- Lecture 41 - Determination of Symmetries of Normal Modes of Vibration - I
- Lecture 42 - Determination of Symmetries of Normal Modes of Vibration - II
- Lecture 43 - A Shortcut to Symmetry of Normal Modes
- Lecture 44 - Normal Modes
- Lecture 45 - IR and Raman Activity - I
- Lecture 46 - IR and Raman Activity - II
- Lecture 47 - Electronic Spectroscopy
- Lecture 48 - Electronic Spectra
- Lecture 49 - Rotational Fine Structure
- Lecture 50 - Symmetry of Electronic States
- Lecture 51 - Electronic States of Oxygen
- Lecture 52 - Electronic States and Transitions of Benzene
- Lecture 53 - Vibronic Coupling
- Lecture 54 - Electronic Spectrum of Benzene
- Lecture 55 - Basics of NMR Spectroscopy - I
- Lecture 56 - Basics of NMR Spectroscopy - II
- Lecture 57 - Spin Spin Coupling- AX systems
- Lecture 58 - Coupling in A2 systems
- Lecture 59 - Coupling in A2 systems (Continued...)
- Lecture 60 - NMR
- Lecture 61 - FT NMR 1800 Pulses and Relaxation Phenomenon
- Lecture 62 - Relaxation Phenomenon



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

Subject Co-ordinator - Prof. P. Ghosh

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Transition Metal Allyl and Enyl Complexes  
Lecture 2 - Transition Metal Allyl and Enyl complexes  
Lecture 3 - Transition Metal Allyl and Enyl complexes  
Lecture 4 - Transition Metal Allyl and Enyl Complexes  
Lecture 5 - Types of Transition Metal Sandwich Complexes  
Lecture 6 - Transition Metal Cyclobutadiene Complexes  
Lecture 7 - Transition Metal Cyclobutadiene Complexes  
Lecture 8 - Transition Metal Cyclobutadiene Complexes  
Lecture 9 - Transition Metal Cyclopentadiene Complexes  
Lecture 10 - Transition Metal Cyclopentadiene Complexes  
Lecture 11 - Transition Metal Cyclopentadiene Complexes  
Lecture 12 - Transition Metal Cyclopentadiene Complexes  
Lecture 13 - Transition Metal Cyclopentadiene Complexes  
Lecture 14 - Transition Metal Cyclopentadiene Complexes  
Lecture 15 - Transition Metal Cyclopentadienyl Carbonyl Complexes  
Lecture 16 - Transition Metal Cyclopentadienyl Carbonyl Complexes  
Lecture 17 - Transition Metal Cyclopentadienyl Nitrosyl Complexes  
Lecture 18 - Transition Metal Cyclopentadienyl Hydride Complexes  
Lecture 19 - Transition Metal Cyclopentadienyl Hydride and Halide Complexes  
Lecture 20 - Transition Metal Cyclopentadienyl Halide Complexes  
Lecture 21 - Transition Metal Cyclopentadienyl Halide and Transition Metal Arene Complexes  
Lecture 22 - Transition Metal Arene Complexes  
Lecture 23 - Transition Metal Arene Complexes  
Lecture 24 - Transition Metal Arene Complexes  
Lecture 25 - Transition Metal Arene Complexes  
Lecture 26 - Transition Metal Arene Carbonyl Complexes  
Lecture 27 - Transition Metal Arene Carbonyl Complexes  
Lecture 28 - Transition Metal Arene Cyclopentadienyl Complexes  
Lecture 29 - Transition Metal Arene Cyclopentadienyl and C<sub>7</sub>H<sub>7</sub> Complexes

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

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- Lecture 30 - Transition Metal C<sub>7</sub>H<sub>7</sub> Complexes
- Lecture 31 - Transition Metal C<sub>7</sub>H<sub>7</sub> Complexes
- Lecture 32 - Transition Metal C<sub>8</sub>H<sub>8</sub> and C<sub>7</sub>H<sub>7</sub> Complexes
- Lecture 33 - Transition Metal C<sub>8</sub>H<sub>8</sub> Complexes
- Lecture 34 - Transition Metal  $\pi$ -complexes of heterocycles
- Lecture 35 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 36 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 37 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 38 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 39 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 40 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 41 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 42 - C $\rightarrow$ C Cross Coupling Reactions
- Lecture 43 - Hydrocyanation Reactions
- Lecture 44 - C $\rightarrow$ E heteroatom Coupling
- Lecture 45 - C $\rightarrow$ E heteroatom Coupling
- Lecture 46 - C $\rightarrow$ E Heteroatom Coupling
- Lecture 47 - C $\rightarrow$ E Heteroatom Coupling
- Lecture 48 - C $\rightarrow$ E Heteroatom Coupling
- Lecture 49 - Organometallic Catalysis Reactions
- Lecture 50 - Organometallic Catalysis Reactions
- Lecture 51 - Organometallic Catalysis Reactions
- Lecture 52 - Organometallic Catalysis Reactions
- Lecture 53 - Organometallic Catalysis Reactions
- Lecture 54 - Organometallic Catalysis Reactions
- Lecture 55 - Organometallic Catalysis Reactions
- Lecture 56 - Organometallic Catalysis Reactions
- Lecture 57 - Organometallic Catalysis Reactions
- Lecture 58 - Organometallic Catalysis Reactions
- Lecture 59 - Organometallic Catalysis Reactions
- Lecture 60 - Summary of Advanced Transition Metal Organometallic Chemistry

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Mechanisms in Organic Chemistry

Subject Co-ordinator - Prof. Nandita Madhavan

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction to Reaction Mechanisms  
Lecture 2 - Writing Reaction Mechanisms  
Lecture 3 - Types of Polar Reactions  
Lecture 4 - The Radical Reactions  
Lecture 5 - Reaction Co-ordinate Diagrams  
Lecture 6 - The Hammond Postulate  
Lecture 7 - Kinetic versus Thermodynamic Control  
Lecture 8 - Curtin-Hammett Principle  
Lecture 9 - An Introduction to Reaction Kinetics  
Lecture 10 - Deriving the Rate Laws  
Lecture 11 - Distinguishing Reaction Mechanisms Using Rate Laws  
Lecture 12 - Methods to Monitor a Reaction  
Lecture 13 - The Hammett Equation  
Lecture 14 - Linear Free Energy Relationships (LFER)  
Lecture 15 - Hammett Plots for Electronic Effects  
Lecture 16 - Scales used in Hammett Plots  
Lecture 17 - Deviation from Linear Free Energy Relationships  
Lecture 18 - LFER for Sterics  
Lecture 19 - Solvent Effects - Part A  
Lecture 20 - Solvent Effects - Part B  
Lecture 21 - Kinetic Isotope Effect  
Lecture 22 - Primary Kinetic Isotope Effect  
Lecture 23 - Secondary Kinetic Isotope Effect - Part A  
Lecture 24 - Secondary Kinetic Isotope Effect - Part B  
Lecture 25 - Heavy Atom Isotope Effects  
Lecture 26 - Equilibrium Isotope Effects  
Lecture 27 - Isotope Labelling  
Lecture 28 - Trapping Intermediates - Part A  
Lecture 29 - Trapping Intermediates - Part B

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

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- Lecture 30 - Trapping Intermediates - Part C
- Lecture 31 - Checking for Common Intermediates
- Lecture 32 - Catalysis - Part A
- Lecture 33 - Catalysis - Part B
- Lecture 34 - Specific Catalysis
- Lecture 35 - General Catalysis - Part A
- Lecture 36 - General Catalysis - Part B
- Lecture 37 - Enzyme Catalysis
- Lecture 38 - Electrophilic Catalysis
- Lecture 39 - Other Types of Catalysis
- Lecture 40 - Course Summary

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Metals in Biology

Subject Co-ordinator - Prof.Debabrata Maiti

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Importance of metals in biology  
Lecture 2 - Choice, uptake and assembly of metal ions in cells  
Lecture 3 - Control and use of metal ions concentration in biological systems  
Lecture 4 - Metal mediated folding of biopolymers  
Lecture 5 - Study of binding mode of calcium and zinc in proteins  
Lecture 6 - Electron transfer (ET) in living systems  
Lecture 7 - Oxygen transport and activation  
Lecture 8 - Hydrolytic Enzymes - Part I - Carbonic anhydrase and Liver alcohol dehydrogenase  
Lecture 9 - Hydrolytic Enzymes - Part II - Carbopeptidase  
Lecture 10 - Hydrolytic Enzymes - Part III - Arginase and Urease  
Lecture 11 - Hemerythrin and azidomethemerythrin  
Lecture 12 - Dioxygen reactivity in copper  
Lecture 13 - Cu-O<sub>2</sub> intermediates  
Lecture 14 - Copper-Oxygen chemistry - Part I - Mononuclear copper-oxygen  
Lecture 15 - Copper-Oxygen chemistry - Part II - Cu-O<sub>2</sub> complexes  
Lecture 16 - Copper-Oxygen chemistry - Part III - Reactivity summary  
Lecture 17 - Iron Catalyzed oxidation of unactivated sp<sup>3</sup> C-H bonds - Part I  
Lecture 18 - Iron catalyzed oxidation of unactivated sp<sup>3</sup> C-H bonds - Part II  
Lecture 19 - Iron catalyzed oxidation of unactivated sp<sup>3</sup> C-H bonds - Part III  
Lecture 20 - Nitrous oxide reductase and its model complex  
Lecture 21 - Cytochrome C-oxidase  
Lecture 22 - Systematic variations in O-O stretch in Iron-oxo-copper ligand complex  
Lecture 23 - Mononuclear nonheme iron (NHI) enzymes  
Lecture 24 - Alpha-Keto Glutarate dependent Halogenases  
Lecture 25 - Cytochrome P450 - Part I - Introduction  
Lecture 26 - Cytochrome P450 - Part II - Reactions  
Lecture 27 - Cytochrome P450 - Part III - Mechanism  
Lecture 28 - Cytochrome P450 - Part IV - Role of Cystine ligand and distal charge relay  
Lecture 29 - Methane monooxygenase

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- Lecture 30 - Dinuclear Iron active sites for CH<sub>4</sub> to CH<sub>4</sub>OH conversion and its Mechanism
- Lecture 31 - Concerted Vs radical pathway for CH<sub>4</sub> to CH<sub>4</sub>OH conversion
- Lecture 32 - Photosynthesis - Part I
- Lecture 33 - Photosynthesis - Part II
- Lecture 34 - Pumps and channels
- Lecture 35 - Quick summary on O<sub>2</sub> transport
- Lecture 36 - Summary of Dioxygen reactivity in copper
- Lecture 37 - Summary of Dioxygen reactivity in iron
- Lecture 38 - Summary of Fe-O<sub>2</sub> chemistry

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:NMR Spectroscopy for Chemists and Biologists

Subject Co-ordinator - Prof. Ashutosh Kumar

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Basic concepts  
Lecture 2 - Resonance absorption  
Lecture 3 - Bloch Equations  
Lecture 4 - Relaxation  
Lecture 5 - Introduction to Chemical Shift  
Lecture 6 - Factors affecting Isotropic Chemical Shifts  
Lecture 7 - Spin-Spin Coupling  
Lecture 8 - Interpretation of multiplet structure using first order analysis  
Lecture 9 - Analysis of NMR spectra of molecules  
Lecture 10 - Quantum Mechanical Analysis - Part I  
Lecture 11 - Quantum Mechanical Analysis - Part II  
Lecture 12 - Dynamic effects in the NMR Spectra  
Lecture 13 - Fourier Transform NMR  
Lecture 14 - Theorems on Fourier Transform  
Lecture 15 - Practical aspects of Fourier Transform NMR spectra  
Lecture 16 - Data Processing in Fourier Transform NMR  
Lecture 17 - Dynamic range in Fourier Transform NMR  
Lecture 18 - Spin Echo and Solvent Suppression  
Lecture 19 - Spin Decoupling in FT NMR and Relaxation Measurements  
Lecture 20 - Polarization Transfer  
Lecture 21 - Nuclear Overhauser Effect  
Lecture 22 - Steady state NOE and Transient NOE  
Lecture 23 - Distance and NOE  
Lecture 24 - Selective Population Inversion  
Lecture 25 - INEPT and Sensitivity Enhancement  
Lecture 26 - Rotating Frame Experiments  
Lecture 27 - Density matrix description of NMR - I  
Lecture 28 - Density matrix description of NMR - II  
Lecture 29 - Density matrix description of NMR - III

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- Lecture 30 - Time evolution of density operator
- Lecture 31 - Density matrix description of NMR - IV
- Lecture 32 - Evolution of density operator in the presence of RF
- Lecture 33 - Product operator formalism
- Lecture 34 - Product operator formalism (Continued...)
- Lecture 35 - Product operator formalism (Continued...)
- Lecture 36 - Time evolution of basis operators
- Lecture 37 - Observable and Non-observable basis operators, Spin echo
- Lecture 38 - Spin echo (Continued...)
- Lecture 39 - INEPT
- Lecture 40 - Multidimensional NMR Spectroscopy
- Lecture 41 - Two Dimensional NMR - Part I
- Lecture 42 - Two Dimensional NMR - Part II
- Lecture 43 - Types of 2D NMR Spectra
- Lecture 44 - Two Dimensional Separation of Interaction in NMR
- Lecture 45 - Two Dimensional Correlation Experiments - I
- Lecture 46 - Two Dimensional Correlation Experiments - II
- Lecture 47 - Two Dimensional Correlation Experiments - III
- Lecture 48 - Double Quantum Filtered COSY (DQF-COSY)
- Lecture 49 - Two Dimensional Nuclear Overhauser Effect Spectroscopy (2D- NOESY)
- Lecture 50 - Constant-time COSY
- Lecture 51 - Scaling in 2D NMR
- Lecture 52 - Total Correlation Spectroscopy
- Lecture 53 - 2D Heteronuclear Experiment - I
- Lecture 54 - 2D Heteronuclear Experiment - II
- Lecture 55 - Multidimensional NMR
- Lecture 56 - Structure Determination of Peptides by NMR - I
- Lecture 57 - Structure Determination of Peptides by NMR - II
- Lecture 58 - Protein-Ligand Interaction - I
- Lecture 59 - Protein-Ligand Interaction - II
- Lecture 60 - Diffusion Ordered Spectroscopy



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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Basics in Inorganic Chemistry

Subject Co-ordinator - Prof.Debabrata Maiti

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Concept of Effective Nuclear Charge
- Lecture 2 - Electronic Configuration of Elements
- Lecture 3 - Properties of Elements (Size, IE, EA and EN)
- Lecture 4 - Extraction of Metals
- Lecture 5 - Ellingham Diagram
- Lecture 6 - Thermit Process and Zone Refining
- Lecture 7 - Coordination Chemistry
- Lecture 8 - Crystal Field Theory
- Lecture 9 - Crystal Field Theory
- Lecture 10 - Crystal Field Theory
- Lecture 11 - Application of CFSE
- Lecture 12 - Introduction to Molecular Magnetism
- Lecture 13 - Problem Solving Approach
- Lecture 14 - Magnetism
- Lecture 15 - Spectroscopic Term Symbol
- Lecture 16 - Magnetic States of Matter
- Lecture 17 - Introduction to Bio-Inorganic Chemistry
- Lecture 18 - Metalloprotein (Hb, Mb, Transferrin) and Metalloenzyme (Plastocyanin)
- Lecture 19 - Oxygen Transportation Mechanism

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Ultrafast Laser Spectroscopy

Subject Co-ordinator - Prof. Anindya Datta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction  
Lecture 2 - Steady State Spectra  
Lecture 3 - Spectro Photometer  
Lecture 4 - How to record Absorption and Emission Spectra  
Lecture 5 - Excited state processes  
Lecture 6 - TCSPC for picosecond- Nanosecond Time Domain  
Lecture 7 - TCSPC for picosecond- Nanosecond Time Domain (Continued...)  
Lecture 8 - TCSPC Lab  
Lecture 9 - Data Fitting 1  
Lecture 10 - Data Fitting 2  
Lecture 11 - Femtosecond Fluorescence Upconversion - 1  
Lecture 12 - Femtosecond Fluorescence Upconversion - 2  
Lecture 13 - Femtosecond Fluorescence Upconversion - 3  
Lecture 14 - FOG Lab  
Lecture 15 - Gate Detectors and Streak Camera - Part 1  
Lecture 16 - Gate Detectors and Streak Camera - Part 2  
Lecture 17 - Stimulated Emission  
Lecture 18 - Two Level System  
Lecture 19 - 3 and 4 level system  
Lecture 20 - From CW to Pulsed Laser  
Lecture 21 - Longitudinal modes  
Lecture 22 - Modelocking for short pulses  
Lecture 23 - Modelocking for short pulses (Continued...)  
Lecture 24 - Kerr lens Modelocking for femtosecond pulses  
Lecture 25 - Titanium Sapphire lasers  
Lecture 26 - Active and Passive Modelocking  
Lecture 27 - Modelocking and cavity damping  
Lecture 28 - Ti  
Lecture 29 - Cavity Dumping

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

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- Lecture 30 - Cavity dumping (Continued...)
- Lecture 31 - Q switching
- Lecture 32 - Stretching and compressing ultrafast laser pulses
- Lecture 33 - Pulse stretcher/Compressor
- Lecture 34 - Chirped pulsed amplification
- Lecture 35 - Oscillators and Amplifier
- Lecture 36 - Alexandrite and fibril lasers
- Lecture 37 - Regenerative amplifier in our lab
- Lecture 38 - Brief overview of nonlinear optical phenomena
- Lecture 39 - Brief overview of nonlinear optical phenomena (Continued...)
- Lecture 40 - Brief overview of nonlinear optical phenomena (Continued...)
- Lecture 41 - SFG and SHG with ultrafast pulses
- Lecture 42 - SFG and SHG with ultrafast pulses (Continued...)
- Lecture 43 - Optical parametric generation and amplification
- Lecture 44 - OPA in our lab TOPAS C - Part 1
- Lecture 45 - OPA in our lab TOPAS C - Part 2
- Lecture 46 - OPA in our lab TOPAS C - Part 3
- Lecture 47 - Snapshots of bond breaking
- Lecture 48 - Twisted Intramolecular Charge Transfer - Part 1
- Lecture 49 - Twisted Intramolecular Charge Transfer - Part 2
- Lecture 50 - Solvation dynamics - Part 1
- Lecture 51 - Solvation dynamics - Part 2
- Lecture 52 - Vibrational energy transfer in water
- Lecture 53 - Excited state proton transfer
- Lecture 54 - Excited state double proton transfer of 7-Azaindole dimer - 1
- Lecture 55 - Excited state double proton transfer of 7-Azaindole dimer - 2
- Lecture 56 - Excited state double proton transfer of 7-Azaindole dimer - 3
- Lecture 57 - Plasmonic nanoparticles - 1
- Lecture 58 - Plasmonic nanoparticles - 2
- Lecture 59 - Nanoclusters
- Lecture 60 - Semiconductor Nanocrystals - Part 1
- Lecture 61 - Semiconductor nanocrystals - Part 2
- Lecture 62 - Radiative and Nonradiative Relaxation Pathways in CdSe Nanocrystals - Part 1
- Lecture 63 - Radiative and Nonradiative Relaxation Pathways in CdSe Nanocrystals - Part 2
- Lecture 64 - Multiexciton in semiconductor nanocrystals - Part 1
- Lecture 65 - Multiexciton in semiconductor nanocrystals - Part 2
- Lecture 66 - Two dimensional Infrared spectroscopy
- Lecture 67 - 2DIR

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Transition Metal Organometallics in Catalysis and Biolo

Subject Co-ordinator - Prof. Prasenjit Ghosh

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction  
Lecture 2 - Reppe Synthesis (Introduction)  
Lecture 3 - Reppe Reactions - Part 1  
Lecture 4 - Reppe Reactions - Part 2  
Lecture 5 - Reppe Reactions - Part 3  
Lecture 6 - Metallative and Conventional Reppeand Metathesis Reaction (Introduction)  
Lecture 7 - Origin of Olefin Metathesis  
Lecture 8 - Mechanistic approaches of Metathesis Reaction - Part 1  
Lecture 9 - Mechanistic approaches of Metathesis Reaction - Part 2  
Lecture 10 - Mechanistic approaches of Metathesis Reaction - Part 3  
Lecture 11 - Mechanistic approaches of Metathesis Reaction - Part 4  
Lecture 12 - Types of Carbenes  
Lecture 13 - Types of Metathesis Reactions  
Lecture 14 - Alkyne Metathesis  
Lecture 15 - Catalysis Development Aspect of Olefin Metathesis - Part 1  
Lecture 16 - Catalysis Development Aspect of Olefin Metathesis - Part 2  
Lecture 17 - Catalysis Development Aspect of Olefin Metathesis - Part 3  
Lecture 18 - Catalysis Development Aspect of Olefin Metathesis - Part 4  
Lecture 19 - Cross Metathesis - Part 1  
Lecture 20 - Cross Metathesis - Part 2  
Lecture 21 - Cross Metathesis - Part 3  
Lecture 22 - Ring Opening Metathesis - Part 1  
Lecture 23 - Ring Opening Metathesis - Part 2  
Lecture 24 - Ring Opening Metathesis - Part 3  
Lecture 25 - Ring Closing Metathesis - Part 1  
Lecture 26 - Ring Closing Metathesis - Part 2  
Lecture 27 - Ring Closing Metathesis - Part 3  
Lecture 28 - Alkyne Metathesis  
Lecture 29 - Alkene Alkyne Metathesis - Part 1

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

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- Lecture 30 - Alkene Alkyne Metathesis - Part 2
- Lecture 31 - Alkene Alkyne Metathesis - Part 3
- Lecture 32 - Ring Closing Eneyne Metathesis (RCEYM) - Part 1
- Lecture 33 - Ring Closing Eneyne Metathesis (RCEYM) - Part 2
- Lecture 34 - Ring Closing Eneyne Metathesis (RCEYM) and Alkenes and Alkynes oligomerization reactions
- Lecture 35 - Oligomerization of alkenes and alkynes - Part 1
- Lecture 36 - Oligomerization of alkenes and alkynes - Part 2
- Lecture 37 - Oligomerization of alkenes and alkynes - Part 3
- Lecture 38 - Oligomerization of alkenes and alkynes - Part 4
- Lecture 39 - Alkene oligomerization and Polymerization.
- Lecture 40 - Olefin Polymerization - Part 1
- Lecture 41 - Olefin Polymerization - Part 2
- Lecture 42 - Olefin Polymerization - Part 3
- Lecture 43 - Olefin Polymerization - Part 4
- Lecture 44 - Olefin Polymerization - Part 5
- Lecture 45 - Olefin Polymerization - Part 6
- Lecture 46 - Olefin Polymerization - Part 7
- Lecture 47 - Olefin Polymerization - Part 8
- Lecture 48 - Olefin Polymerization - Part 9
- Lecture 49 - Olefin Polymerization - Part 10
- Lecture 50 - Olefin Polymerization - Part 11
- Lecture 51 - Olefin Polymerization - Part 12
- Lecture 52 - Olefin Polymerization - Part 13
- Lecture 53 - Olefin Polymerization - Part 14
- Lecture 54 - Olefin Polymerization - Part 15
- Lecture 55 - Olefin Polymerization - Part 16
- Lecture 56 - Homo and Copolymerization; Functionalized olefins, Cycloolefins and Diolefins
- Lecture 57 - Non- Group IV Metal based olefin polymerization catalysts
- Lecture 58 - Non- Group IV Metal based olefin polymerization catalysts
- Lecture 59 - Bioorganometallic Chemistry
- Lecture 60 - Overall summary of Transition metal organometallics in catalysis and biology

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Quantum Chemistry of Atoms and Molecules

Subject Co-ordinator - Prof. Anindya Datta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Basic Introduction  
Lecture 2 - Bohr Model and Beyond  
Lecture 3 - The wave nature of matter  
Lecture 4 - Ground Rules  
Lecture 5 - Ground Rules  
Lecture 6 - Particle in a box - Part I  
Lecture 7 - Particle in a box - Part II  
Lecture 8 - Particle in a box - Part III  
Lecture 9 - Particle in a box - Uncertainty Principle  
Lecture 10 - Particle in a box - Uncertainty Principle (Continued...)  
Lecture 11 - Quantum Mechanical Tunneling  
Lecture 12 - Harmonic Oscillator - Part 1  
Lecture 13 - Harmonic Oscillator - Part 2  
Lecture 14 - Harmonic Oscillator - Part 3  
Lecture 15 - Harmonic Oscillators - Wave Functions and Recursion formulae  
Lecture 16 - Harmonic Oscillators - Wave Functions and Recursion formulae (Continued...)  
Lecture 17 - Harmonic Oscillators  
Lecture 18 - Rigid Rotor - Part 1  
Lecture 19 - Rigid Rotor - Part 2  
Lecture 20 - Rigid Rotor - Part 3  
Lecture 21 - Polar Plots of Spherical Harmonics  
Lecture 22 - Angular Momentum  
Lecture 23 - Angular Momentum (Continued...)  
Lecture 24 - Hydrogen Atom  
Lecture 25 - Hydrogen Atom  
Lecture 26 - Hydrogen atom  
Lecture 27 - Radial Probability distribution functions  
Lecture 28 - Hydrogen atom wavefunctions  
Lecture 29 - 2s orbital

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

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- Lecture 30 - 2p orbitals
- Lecture 31 - 3pz and 3d orbitals
- Lecture 32 - Atomic orbitals and orbital approximation
- Lecture 33 - Multi electron atoms
- Lecture 34 - He atom wavefunction
- Lecture 35 - Excited states of many electron atoms
- Lecture 36 - Introduction to Perturbation theory
- Lecture 37 - Scope of Perturbation theory
- Lecture 38 - Application of Perturbation theory
- Lecture 39 - Higher order perturbations
- Lecture 40 - Perturbation theory for non-degenerate states
- Lecture 41 - Perturbation Theory for degenerate states
- Lecture 42 - Application of Perturbation Theory for degenerate States
- Lecture 43 - Variation Method
- Lecture 44 - Variational Method (Continued...)
- Lecture 45 - Variational calculations for Harmonic Oscillator and Particle in a Box
- Lecture 46 - Secular equations in Variational calculations
- Lecture 47 - Secular equations for particle in a box
- Lecture 48 - Variational calculation for particle in a box (Continued...)
- Lecture 49 - Perturbation theory for many electron atoms
- Lecture 50 - Variational method for many electron atoms
- Lecture 51 - Hartree-Fock Equations and Self Consistent Fields
- Lecture 52 - Hartree-Fock Equations for He - Part 1
- Lecture 53 - Hartree-Fock Equations for He - Part 2
- Lecture 54 - Electronic Wavefunctions of He atom
- Lecture 55 - Valance Bond Theory and homonuclear diatomics - Part 1
- Lecture 56 - Valance Bond Theory and homonuclear diatomics - Part 2
- Lecture 57 - Molecular shape and hybrid orbitals
- Lecture 58 - sp<sup>2</sup> hybridization
- Lecture 59 - sp<sup>3</sup> hybridization
- Lecture 60 - Non-equivalent hybrid orbitals
- Lecture 61 - Molecular Orbital Theory for H<sub>2</sub><sup>+</sup>
- Lecture 62 - Molecular orbital theory for homonuclear diatomic molecules
- Lecture 63 - Beyond Homonuclear diatomic molecules
- Lecture 64 - MOT for polyatomic molecules
- Lecture 65 - Huckel MOT-1
- Lecture 66 - Huckel MOT-2
- Lecture 67 - The last word

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Basic Statistical Mechanics

Subject Co-ordinator - Prof. Biman Bagchi

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Why Study Statistical Mechanics?  
Lecture 2 - Thermodynamics  
Lecture 3 - Probability Theory - Part 1  
Lecture 4 - Probability Theory - Part 2  
Lecture 5 - Fundamental concepts and Postulates of Statistical Mechanics - Part 1  
Lecture 6 - Fundamental concepts and Postulates of Statistical Mechanics - Part 2  
Lecture 7 - From Postulates to Formulation  
Lecture 8 - Microcanonical Ensemble  
Lecture 9 - Relation with Thermodynamics in Microcanonical Ensemble - Part 1  
Lecture 10 - Relation with Thermodynamics in Microcanonical Ensemble - Part 2  
Lecture 11 - Canonical Ensemble - Part 1  
Lecture 12 - Canonical Ensemble - Part 2  
Lecture 13 - Thermodynamic Potential for Canonical ensemble  
Lecture 14 - Grand Canonical Ensemble  
Lecture 15 - Thermodynamic Potentials for Grand Canonical and Isothermal-Isobaric ensembles  
Lecture 16 - Fluctuations and Response Function - Part 1  
Lecture 17 - Fluctuations and Response Function - Part 2  
Lecture 18 - Ideal Monatomic Gas  
Lecture 19 - Ideal Monatomic Gas  
Lecture 20 - Ideal Monatomic Gas  
Lecture 21 - Ideal Monatomic Gas  
Lecture 22 - Ideal Monatomic Gas  
Lecture 23 - Ideal Gas of Diatomic Molecules  
Lecture 24 - Ideal Gas of Diatomic Molecules  
Lecture 25 - Ideal Gas of Diatomic Molecules  
Lecture 26 - Ideal Gas of Diatomic Molecules  
Lecture 27 - Ideal Gas of Polyatomic molecules  
Lecture 28 - Cluster Expansion and Mayer's Theory of Condensation - Part 1  
Lecture 29 - Cluster Expansion and Mayer's Theory of Condensation - Part 2

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

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- Lecture 30 - Cluster Expansion and Mayer's Theory of Condensation - Part 3
- Lecture 31 - Cluster Expansion and Mayer's Theory of Condensation - Part 4
- Lecture 32 - Cluster Expansion and Mayer's Theory of Condensation - Part 5
- Lecture 33 - Cluster Expansion and Mayer's Theory of Condensation - Part 6
- Lecture 34 - Phase Transition and Landau Theory - Part 1
- Lecture 35 - Phase Transition and Landau Theory - Part 2
- Lecture 36 - Phase Transition and Landau Theory - Part 3
- Lecture 37 - Comments on some important Concepts of Statistical Mechanics
- Lecture 38 - Nucleation Part 1
- Lecture 39 - Nucleation Part 2
- Lecture 40 - Nucleation Part 3
- Lecture 41 - Nucleation Part 4
- Lecture 42 - Spinodal Decomposition and Pattern Formation
- Lecture 43 - Spinodal Decomposition and Pattern Formation
- Lecture 44 - Ising Model and Other Lattice Models - Part 1
- Lecture 45 - Ising Model and Other Lattice Models - Part 2
- Lecture 46 - Ising Model and Other Lattice Models - Part 3
- Lecture 47 - Ising Model and Other Lattice Models - Part 4
- Lecture 48 - Ising Model and Other Lattice Models - Part 5
- Lecture 49 - Binary Mixtures
- Lecture 50 - Binary Mixtures
- Lecture 51 - Theory of Liquids - Part 1
- Lecture 52 - Theory of Liquids - Part 2
- Lecture 53 - Theory of Liquids - Part 3
- Lecture 54 - Theory of Liquids - Part 4
- Lecture 55 - Polymers in Solution and Polymer Collapse - Part 1
- Lecture 56 - Polymers in Solution and Polymer Collapse - Part 2
- Lecture 57 - Polymers in Solution and Polymer Collapse - Part 3
- Lecture 58 - Polymers in Solution and Polymer Collapse - Part 4
- Lecture 59 - Computer Simulation Methods in Statistical Mechanics - Part 1
- Lecture 60 - Computer Simulation Methods in Statistical Mechanics - Part 2
- Lecture 61 - Conclusion

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Quantum Mechanics and Molecular Spectroscopy

Subject Co-ordinator - Prof. Naresh Patwari

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction to quantum Mechanics - Part 1  
Lecture 2 - Introduction to quantum Mechanics - Part 2  
Lecture 3 - Introduction to quantum Mechanics - Part 3  
Lecture 4 - Time Dependant Perturbation Theory of Two states - Part 1  
Lecture 5 - Time Dependent Perturbation Theory of Two States - Part 2  
Lecture 6 - Time Dependent Perturbation Theory of Two States - Part 3  
Lecture 7 - Time Dependent Perturbation Theory of Many States - Part 1  
Lecture 8 - Time Dependent Perturbation Theory of Many States - Part 2  
Lecture 9 - First-Order Correction to Time- Dependent Perturbation Theory  
Lecture 10 - Properties of Light (Classical Treatment)  
Lecture 11 - Interaction Hamiltonian - Part 1  
Lecture 12 - Interaction Hamiltonian - Part 2  
Lecture 13 - Interaction Hamiltonian - Part 3  
Lecture 14 - Transition Moment Integral  
Lecture 15 - Absorption Probability - Part 1  
Lecture 16 - Absorption Probability - Part 2  
Lecture 17 - Transition to Continuum States  
Lecture 18 - Einstein's Coefficient - Part 1  
Lecture 19 - Einstein's Coefficient - Part 2  
Lecture 20 - Einstein's Coefficient - Part 3  
Lecture 21 - Spontaneous Emission Lifetime  
Lecture 22 - Relationship between Transition Dipole and Extinction Coefficient  
Lecture 23 - Spectral Lineshapes  
Lecture 24 - Selection Rules  
Lecture 25 - Molecular Rotations - Part 1  
Lecture 26 - Molecular Rotations - Part 2  
Lecture 27 - Molecular Rotations - Part 3  
Lecture 28 - Rotational Selection Rules  
Lecture 29 - Rotational Spectrum

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

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- Lecture 30 - Molecular Vibrations - Part 1
- Lecture 31 - Molecular Vibrations - Part 2
- Lecture 32 - Vibrational Selection rules
- Lecture 33 - Electronic Transition
- Lecture 34 - Rotations of Polyatomic Molecules - Part 1
- Lecture 35 - Rotations of Polyatomic Molecules - Part 2
- Lecture 36 - Selection Rules for particle in a box
- Lecture 37 - Interpretation of Rotational Spectra
- Lecture 38 - Features of vibrational and electronic spectroscopy

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Essentials of Oxidation, Reduction and C-C Bond Formation

Subject Co-ordinator - Prof. Yashwant D Vankar

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Introduction to organic synthesis-Importance of selectivity, stereochemistry and Mechanism
- Lecture 2 - Sulfur based oxidations of alcohols
- Lecture 3 - Sulfur based oxidations and Pummerer rearrangement
- Lecture 4 - Further aspects of sulfur and selenium based oxidations
- Lecture 5 - Organoselenium chemistry and SeO<sub>2</sub> based oxidations
- Lecture 6 - SeO<sub>2</sub> based oxidation of ketones and Sulfoxide- Sulfenate rearrangement (Mislow-Evans rearrangement)
- Lecture 7 - Mechanistic and stereochemical aspects of Mislow-Evans rearrangement and synthetic applications
- Lecture 8 - Further synthetic applications of Mislow-Evans rearrangement and Saegusa-Ito oxidation
- Lecture 9 - 1,2-Ketone transpositions, Shapiro reaction and Dauben-Michno rearrangement (a case of 1,3-enone)
- Lecture 10 - Dess-Martin periodinane oxidation
- Lecture 11 - Iodoxybenzoic acid (IBX) based oxidations
- Lecture 12 - Silver based oxidations: Prevost reaction and use of Fetizon's reagent
- Lecture 13 - Further aspects of oxidations using Fetizon's reagent: Mechanism and Stereochemistry
- Lecture 14 - Ruthenium tetroxide (and RuCl<sub>3</sub>/NaIO<sub>4</sub>) mediated oxidations
- Lecture 15 - Tetra-n-propylammonium perruthenate (TPAP) based oxidations, and Tamao-Fleming oxidation
- Lecture 16 - Further synthetic and mechanistic aspects of Tamao-Fleming oxidations
- Lecture 17 - Oxidations with dimethyl dioxirane (DMDO)
- Lecture 18 - Mechanistic aspects of DMDO based oxidations and oxaziridine mediated alpha-hydroxylations of ketones
- Lecture 19 - Asymmetric alpha-hydroxylations using oxaziridine based reactions
- Lecture 20 - Barton and related reactions (oxidation at unfunctionalised carbons) and synthetic applications
- Lecture 21 - beta-Cleavage in Barton and related reactions and miscellaneous oxidations such as TEMPO based oxidations
- Lecture 22 - Reductions in organic chemistry: Metal hydride (NaBH<sub>4</sub> and LiAlH<sub>4</sub>) mediated reduction
- Lecture 23 - Reductions using diisobutylaluminum hydride (DIBAL-H)
- Lecture 24 - Further aspects of DIBAL-H based reductions and comparison with mixed chloride hydrides
- Lecture 25 - Reductions with Red-Al, and Luche Reductions
- Lecture 26 - Further aspects of Luche reduction, stereochemistry in reductions and reduction with LiBH<sub>4</sub>
- Lecture 27 - Reductions with Zn(BH<sub>4</sub>)<sub>2</sub>, LiBHEt<sub>3</sub> (superhydride) and L and K-selectrides
- Lecture 28 - Reductions with LS/KS selectrides and NaCNBH<sub>3</sub>
- Lecture 29 - Dissolving metal reductions (Na, K, Mg) and McMurry coupling using Ti(0)

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- Lecture 30 - Stereochemistry and mechanistic aspects of McMurry coupling and metal mediated reductions of aldehydes
- Lecture 31 - Silanes [ $R_3SiH$ , including polymethylhydrosiloxanes (PMHS)] as reducing agents
- Lecture 32 - Further aspects of silanes as reducing agents and Barton-McCombie deoxygenation
- Lecture 33 - Tributyltinhydride ( $n-Bu_3SnH$ ) based radical based reductions and C-C bond formations
- Lecture 34 - Asymmetric synthesis: An introduction
- Lecture 35 - Sharpless asymmetric epoxidation: Mechanism, stereochemistry and kinetic resolution
- Lecture 36 - Synthetic utility of chiral 2,3-epoxy alcohols obtained from Sharpless epoxidation
- Lecture 37 - Katsuki-Jacobsen epoxidation: Mechanism and stereochemistry
- Lecture 38 - Further aspects of Katsuki-Jacobsen epoxidation, and Introduction to Sharpless Asymmetric Dihydroxylation
- Lecture 39 - Mechanism, stereochemical aspects and synthetic applications of Sharpless Asymmetric Dihydroxylation
- Lecture 40 - Asymmetric hydrogenations and reductions using rhodium and ruthenium derived chiral catalysts
- Lecture 41 - Asymmetric reduction with oxazaborolidines
- Lecture 42 - C-C bond formations: Introduction to enolate, enamine and enol silyl ether based chemistry
- Lecture 43 - C-C bond formations using enol silyl ether and imine based chemistry including SAMP and RAMP based chemistry
- Lecture 44 - Asymmetric C-C bond formations using Oppolzer's camphorsultams and introduction to directed Aldol reactions
- Lecture 45 - Further aspects of Aldol chemistry including the use of boron and silicon enolates
- Lecture 46 - C-C bond formations using Evans' oxazolidinone based chemistry
- Lecture 47 - Ireland-Claisen rearrangement: Emphasis of enolate geometry on the stereochemical outcome, and C-C bond formations
- Lecture 48 - Aromatic Claisen rearrangement, Johnson-Claisen rearrangement and Eschenmoser-Claisen rearrangement
- Lecture 49 - Bellus-Claisen rearrangement, Aza-Claisen rearrangement, Thia-Claisen rearrangement, Chen-Mapparrero rearrangement
- Lecture 50 - Zwitterionic-Claisen rearrangement, Overmann rearrangement, Bamford-Stevens and Shapiro reactions
- Lecture 51 - Introduction to allyl metal additions for C-C bond formation
- Lecture 52 - Allylindium chemistry: Mechanism, stereochemistry and synthetic applications
- Lecture 53 - Allyltin chemistry: Mechanism, stereochemistry and synthetic applications
- Lecture 54 - Chemistry of allylsilanes: Mechanism, stereochemistry and synthetic applications - Part 1
- Lecture 55 - Further synthetic aspects of the chemistry of allylsilanes - Part 2
- Lecture 56 - Further synthetic aspects of the chemistry of allylsilanes - Part 3
- Lecture 57 - Chemistry of Vinylsilanes: Mechanism, Stereochemistry and Synthetic Applications
- Lecture 58 - Peterson olefination and further synthetic aspects of vinylsilane chemistry
- Lecture 59 - Simmons Smith cyclopropanation: Mechanism, stereochemistry and synthetic applications
- Lecture 60 - Course Summary and Conclusion

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemical Kinetics and Transition State Theory

Subject Co-ordinator - Prof. Amber Jain

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Rate: the reaction velocity  
Lecture 2 - Its elementary - rate law equations  
Lecture 3 - Arrhenius equation: what's the fuss about?  
Lecture 4 - Dance of atoms: from Newton to Hamilton  
Lecture 5 - Boltzmann distribution: a story of Hamilton, Liouville and Boltzmann  
Lecture 6 - Maxwell Boltzmann distribution: how fast are molecules moving?  
Lecture 7 - Kinetic theory of collisions: initial estimate  
Lecture 8 - Boltzmann distribution and kinetic theory of collisions  
Lecture 9 - Kinetic theory of collisions: a discussion  
Lecture 10 - Kinetic theory of collisions: reactive cross section  
Lecture 11 - Problem solving session - 1  
Lecture 12 - Problem solving session - 2  
Lecture 13 - Kinetic theory of collision and equilibrium constant  
Lecture 14 - Critique of kinetic theory of collisions  
Lecture 15 - Transition state theory and partition functions  
Lecture 16 - Partitioning the partition function  
Lecture 17 - Translating, rotating and vibrating quantum mechanically  
Lecture 18 - Partition function and equilibrium constant  
Lecture 19 - What is a transition state?  
Lecture 20 - A puzzle: cars on highway  
Lecture 21 - Transition state theory: derivation 1  
Lecture 22 - Practical calculation of TST rate  
Lecture 23 - Calculating TST rate for the reaction  $\text{H} + \text{HBr}$   
Lecture 24 - Collision theory as a special case of TST  
Lecture 25 - TST: an intuitive proof in one dimension  
Lecture 26 - Rate as a flux across a dividing surface  
Lecture 27 - Transition state theory: derivation 2 from dynamical perspective  
Lecture 28 - Discussion of the assumptions of TST  
Lecture 29 - Thermodynamic formulation of TST

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

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- Lecture 30 - Problem solving session - 3
- Lecture 31 - Problem solving session - 4
- Lecture 32 - Hills and valleys of potential energy surfaces
- Lecture 33 - Molecular dynamics: rolling spheres on potential energy surfaces
- Lecture 34 - Predictions from potential energy surfaces - rotational vs vibrational energies
- Lecture 35 - Free energy and potential of mean force
- Lecture 36 - Transmission coefficient and molecular dynamics
- Lecture 37 - Problem solving session - 5
- Lecture 38 - Microcanonical rate constant: putting balls in jars
- Lecture 39 - Microcanonical rate constant: RRK model
- Lecture 40 - Microcanonical rate constant: magic of Marcus - RRKM model
- Lecture 41 - Canonical TST from microcanonical RRKM model
- Lecture 42 - Sum and density of states
- Lecture 43 - Unimolecular decay - revisited
- Lecture 44 - Unimolecular decay: RRK's approach
- Lecture 45 - Unimolecular decay: RRKM's approach
- Lecture 46 - Problem solving session - 6

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Concepts of Chemistry for Engineering

Subject Co-ordinator - Prof. Anindya Datta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Introduction to quantum theory  
Lecture 2 - Schrodinger's theory  
Lecture 3 - Laws of quantum mechanics  
Lecture 4 - Wave functions  
Lecture 5 - Quantum mechanics of a free particle  
Lecture 6 - Particle in 1D box  
Lecture 7 - Particle in 2D box  
Lecture 8 - Spherical polar coordinates and angular momentum  
Lecture 9 - Developing Hydrogen atom orbitals - 1  
Lecture 10 - Developing Hydrogen atom orbitals - 2  
Lecture 11 - Developing Hydrogen atom orbitals - 3  
Lecture 12 - Visualizing molecular orbitals  
Lecture 13 - Molecular orbital theory 1: Introduction  
Lecture 14 - Molecular orbital theory 2: Diatomic molecules  
Lecture 15 - Molecular orbital theory 3: Homo-diatomic molecules - I  
Lecture 16 - Molecular orbital theory 4: Homo-diatomic molecules - II  
Lecture 17 - Molecular orbital theory 5: Hetero-diatomic molecules  
Lecture 18 - Molecular orbital theory 6: Polyatomic molecules  
Lecture 19 - Molecular orbital theory 7: Ethylene (Introduction to Huckel's theory) - I  
Lecture 20 - Molecular orbital theory 8: Ethylene (Introduction to Huckel's theory) - II  
Lecture 21 - Molecular orbital theory 9: Butadiene - I  
Lecture 22 - Molecular orbital theory 9: Butadiene - II  
Lecture 23 - Concept of effective nuclear charge  
Lecture 24 - Electronic configuration of elements  
Lecture 25 - Properties of Elements (Size, IE, EA and EN)  
Lecture 26 - Polarizability  
Lecture 27 - Hard soft acid base  
Lecture 28 - Predicting molecular structures: VSEPR theory  
Lecture 29 - Coordination Chemistry: 18 electron rule and VBT

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- Lecture 30 - Crystal Field Theory: Octahedral Complex
- Lecture 31 - Crystal Field Theory: Tetrahedral Complex
- Lecture 32 - Crystal Field Theory: Octahedral vs. Tetrahedral Complex
- Lecture 33 - Application of CFSE: Spinel and J-T Distortion
- Lecture 34 - Introduction to Molecular Magnetism
- Lecture 35 - Problem Solving Approach
- Lecture 36 - Magnetism
- Lecture 37 - Spectroscopic Term Symbol
- Lecture 38 - Magnetic States of Matter: Paramagnetic, Ferro and Antiferromagnetic
- Lecture 39 - Band structures of solid materials
- Lecture 40 - Density of states and doping in semiconductors
- Lecture 41 - Introduction to molecular spectroscopy
- Lecture 42 - Rotational spectroscopy
- Lecture 43 - Vibrational spectroscopy
- Lecture 44 - Electronic Spectroscopy - I
- Lecture 45 - Electronic Spectroscopy - II
- Lecture 46 - Electronic Spectroscopy - III
- Lecture 47 - Fluorescence Spectroscopy
- Lecture 48 - Fundamentals of NMR spectroscopy and MRI
- Lecture 49 - Surface characterization techniques
- Lecture 50 - Introduction to thermodynamics: Work, heat and energy
- Lecture 51 - First law of thermodynamics: Diathermic and adiabatic systems, exothermic and endothermic processes
- Lecture 52 - Enthalpy, Hess's law
- Lecture 53 - Second law of thermodynamics: Entropy and third law of thermodynamics
- Lecture 54 - Helmholtz and Gibbs free energies, Concept of spontaneity
- Lecture 55 - Electrochemical equilibrium, Nernst equation
- Lecture 56 - Acid base and solubility equilibria
- Lecture 57 - Corrosion
- Lecture 58 - Extraction of metals
- Lecture 59 - Ellingham Diagram
- Lecture 60 - Problems From Thermodynamics
- Lecture 61 - Intermolecular forces: Electrostatic and Ion-Dipole Interaction
- Lecture 62 - Intermolecular forces: Dipole-dipole, hydrogen bonding
- Lecture 63 - Real gases - Part 1
- Lecture 64 - Real gases - Part 2
- Lecture 65 - Introduction to Potential Energy Surfaces
- Lecture 66 - Potential energy surface of H<sub>3</sub> system
- Lecture 67 - Salient features of H<sub>3</sub> potential energy surface
- Lecture 68 - Potential Energy Surfaces of HCN and H<sub>2</sub>F system

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

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- Lecture 69 - Representation of three dimensional structures
- Lecture 70 - Structural isomers and stereoisomers
- Lecture 71 - Configurations, Symmetry and Chirality
- Lecture 72 - Enantiomers and Diastereomers
- Lecture 73 - Optical activity, Conformational analysis, and absolute configuration
- Lecture 74 - Substitution reactions
- Lecture 75 - Elimination reactions
- Lecture 76 - Addition, Oxidation and Reduction reactions
- Lecture 77 - Synthesis of a drug molecule

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Classics in Total Synthesis-I

Subject Co-ordinator - Prof. Krishna P Kaliappan

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Overview - 1  
Lecture 2 - Overview - 2  
Lecture 3 - Overview - 3  
Lecture 4 - Illudin M (Kinder) Illudin C (Funk)  
Lecture 5 - Total Synthesis of FR900848 (Barrett)  
Lecture 6 - Total Synthesis of Cubane  
Lecture 7 - Total Synthesis of Endiandric acids  
Lecture 8 - Total Synthesis of Penicilin  
Lecture 9 - Total Synthesis of Thienamycin  
Lecture 10 - Total Synthesis of Prostaglandin (Corey)  
Lecture 11 - Total Synthesis of Prostaglandin (Johnson and Stork)  
Lecture 12 - Total Synthesis of Biotin and Lactacystin (i) Corey, (ii) Baldwin  
Lecture 13 - Total Synthesis of Triquinanes: Isocomene 1) M. Pirrung 2) Fitjer  
Lecture 14 - Total Synthesis of Triquinanes: Isocomene and Silphiperfol-6-en-5-one (Rawal)  
Lecture 15 - Total synthesis of Triquinanes by radical cyclisation - I (Curran)  
Lecture 16 - Total synthesis of Triquinanes by radical cyclisation - II  
Lecture 17 - Total synthesis of Triquinanes by photochemical reaction - I  
Lecture 18 - Total synthesis of Triquinanes by photochemical reaction - II  
Lecture 19 - Total synthesis of Triquinanes by Thermal Metathesis (Mehta)  
Lecture 20 - Total synthesis of Triquinanes by other reactions  
Lecture 21 - Total synthesis of Longifolene (Corey and Oppolzer)  
Lecture 22 - Total synthesis of Carpanone (Chapman)  
Lecture 23 - Total synthesis of Mevinolin (Clive)  
Lecture 24 - Total synthesis of Gibberellic Acid (Corey)  
Lecture 25 - Total synthesis of Gibberellic Acid (Yamada)  
Lecture 26 - Total synthesis of Perhydrohistrionicotoxin (Corey)  
Lecture 27 - Total synthesis of Strychnine (Woodward)  
Lecture 28 - Total synthesis of Strychnine (Rawal and Overman)  
Lecture 29 - Total synthesis of Strychnine (Kuehne)

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- Lecture 30 - Total synthesis of Reserpine (Woodward)
- Lecture 31 - Total synthesis of Yohimbine (Tamelen and Momose)
- Lecture 32 - Total synthesis of Quinine (Woodward and Stork)
- Lecture 33 - Total synthesis of Dendrobine (Livinghouse)
- Lecture 34 - Total synthesis of Morphine (Gates and Overman)
- Lecture 35 - Total synthesis of Morphine (Parker and White)
- Lecture 36 - Total synthesis of Methyldhomosecodaphniphyllate (Heathcock)
- Lecture 37 - Total synthesis of Lysergic acid (Woodward and Oppolzer)
- Lecture 38 - Total synthesis of Galanthamine (Barton and Kirby)
- Lecture 39 - Total synthesis of Epibatidine (Trost and Evans)
- Lecture 40 - Total synthesis of Swainsonine (Hashimoto)
- Lecture 41 - Total synthesis of Staurosporine (Danishefsky and Wood)
- Lecture 42 - Total synthesis of Manzamine A (Winkler)
- Lecture 43 - Total synthesis of Progesterone (Johnson)
- Lecture 44 - Total synthesis of Progesterone from Diosgenin (Marker)
- Lecture 45 - Total synthesis of Estrone (Torgov)
- Lecture 46 - Total synthesis of Taxol (Nicolaou)
- Lecture 47 - Total synthesis of Taxol (Holton)
- Lecture 48 - Total synthesis of Taxol (Danishefsky)
- Lecture 49 - Total synthesis of Taxol (Wender)
- Lecture 50 - Total synthesis of Eleutherobin (Nicolaou)
- Lecture 51 - Total synthesis of Eleutherobin (Danishefsky)
- Lecture 52 - Total synthesis of Phorbol (Wender)
- Lecture 53 - Total synthesis of Periplanone (Still and Schreiber)
- Lecture 54 - Total synthesis of Discodermolide (Schreiber)
- Lecture 55 - Total synthesis of Epothilones I (Nicolaou)
- Lecture 56 - Total synthesis of Epothilones II (Schinzer and Danishefsky)
- Lecture 57 - Total synthesis of Vineomycinone B2 (Tius and Danishefsky)
- Lecture 58 - Total synthesis of Zaragozic acid C (Carreira)

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Circular Dichroism (CD) and Mossbauer Spectroscopy for

Subject Co-ordinator - Prof. Arnab Dutta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - CD Spectroscopy: Introduction  
Lecture 2 - Symmetry and Molecular properties  
Lecture 3 - Symmetry elements - I  
Lecture 4 - Symmetry elements - II  
Lecture 5 - Symmetry and point groups - I  
Lecture 6 - Symmetry and point groups - II  
Lecture 7 - Point group determination tutorial  
Lecture 8 - Chirality and point group - I  
Lecture 9 - Chirality and point group - II  
Lecture 10 - Chirality and point group - III tutorial  
Lecture 11 - Chirality and biology - I  
Lecture 12 - Chirality and biology - II  
Lecture 13 - Chirality and biology - III  
Lecture 14 - Chirality and biology - IV  
Lecture 15 - Chirality and biology - V  
Lecture 16 - Origin of chirality  
Lecture 17 - The physical background of chiral response - I  
Lecture 18 - The physical background of chiral response - II  
Lecture 19 - The physical background of chiral response - III  
Lecture 20 - The physical background of chiral response - IV  
Lecture 21 - The physical background of chiral response - IV  
Lecture 22 - The physical background of chiral response - V  
Lecture 23 - The physical background of chiral response - VI  
Lecture 24 - Circular Dichroism Spectra  
Lecture 25 - Examples of Circular Dichroism - I  
Lecture 26 - Examples of Circular Dichroism - II  
Lecture 27 - Examples of Circular Dichroism - III  
Lecture 28 - Examples of Circular Dichroism - IV  
Lecture 29 - Applications of CD spectroscopy - I

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

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- Lecture 30 - Applications of CD spectroscopy - II
- Lecture 31 - Applications of CD spectroscopy - III
- Lecture 32 - Applications of CD spectroscopy - IV
- Lecture 33 - Applications of CD spectroscopy - V
- Lecture 34 - Applications of CD spectroscopy - VI
- Lecture 35 - CD spectroscopy: Conclusion
- Lecture 36 - MÃ Â¶ssbauer Spectroscopy: Introduction
- Lecture 37 - MÃ Â¶ssbauer Spectroscopy Fundamentals - I
- Lecture 38 - MÃ Â¶ssbauer Spectroscopy
- Lecture 39 - MÃ Â¶ssbauer Spectroscopy Fundamentals - II
- Lecture 40 - MÃ Â¶ssbauer Spectroscopy Fundamentals - III
- Lecture 41 - MÃ Â¶ssbauer Spectroscopy Fundamentals - IV
- Lecture 42 - MÃ Â¶ssbauer Spectroscopy: Isomer shift - I
- Lecture 43 - MÃ Â¶ssbauer Spectroscopy: Isomer shift - II
- Lecture 44 - MÃ Â¶ssbauer Spectroscopy: Isomer shift - III
- Lecture 45 - MÃ Â¶ssbauer Spectroscopy: Quadrupolar splitting - I
- Lecture 46 - MÃ Â¶ssbauer Spectroscopy: Quadrupolar splitting - II
- Lecture 47 - MÃ Â¶ssbauer Spectroscopy: Applications - I
- Lecture 48 - MÃ Â¶ssbauer Spectroscopy: Applications - II
- Lecture 49 - MÃ Â¶ssbauer Spectroscopy: Applications - III
- Lecture 50 - MÃ Â¶ssbauer Spectroscopy: Data measurement
- Lecture 51 - MÃ Â¶ssbauer Spectroscopy: Applications - IV
- Lecture 52 - MÃ Â¶ssbauer Spectroscopy: Effect of ligands - I
- Lecture 53 - MÃ Â¶ssbauer Spectroscopy: Effect of ligands - II
- Lecture 54 - MÃ Â¶ssbauer Spectroscopy: Applications - V
- Lecture 55 - MÃ Â¶ssbauer Spectroscopy: Probing ferrocenes - I
- Lecture 56 - MÃ Â¶ssbauer Spectroscopy: Probing ferrocenes - II
- Lecture 57 - MÃ Â¶ssbauer Spectroscopy: Probing ferrocenes - III
- Lecture 58 - MÃ Â¶ssbauer Spectroscopy: Mixed valent complexes - I
- Lecture 59 - MÃ Â¶ssbauer Spectroscopy: Mixed valent complexes - II
- Lecture 60 - MÃ Â¶ssbauer Spectroscopy: Mixed valent complexes - III
- Lecture 61 - Conclusion section: CD spectroscopy
- Lecture 62 - Conclusion section: MÃ Â¶ssbauer Spectroscopy

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:NMR Spectroscopy for Structural Biology

Subject Co-ordinator - Prof. Ashutosh Kumar, Prof. R. V Hosur

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - NMR Basic Concepts - I  
Lecture 2 - NMR Basic Concepts - II  
Lecture 3 - NMR Basic Concepts - III  
Lecture 4 - NMR Basic Concepts - IV  
Lecture 5 - NMR Spectra of Molecules  
Lecture 6 - Chemical Shifts and Coupling constant  
Lecture 7 - Fine Structures in NMR Spectra  
Lecture 8 - Pulse Excitation and FT-NMR  
Lecture 9 - Practical Aspects of FT-NMR - 1  
Lecture 10 - Practical Aspects of FT-NMR - 2  
Lecture 11 - Practical Aspects of FT-NMR - 3  
Lecture 12 - Practical Aspects of FT-NMR - 4  
Lecture 13 - Polarization Transfer Technique - 1  
Lecture 14 - Polarization Transfer Technique - 2  
Lecture 15 - General Concept of Multidimensional NMR - 1  
Lecture 16 - General Concept of Multidimensional NMR - 2  
Lecture 17 - 2-D NMR or 2-D Co-relation spectroscopy : General concept - 1  
Lecture 18 - 2-D NMR or 2-D Co-relation spectroscopy : General concept - 2  
Lecture 19 - 2-D NMR or 2-D Co-relation spectroscopy : General concept - 3  
Lecture 20 - Introduction to NOESY and HSQC - 1  
Lecture 21 - Introduction to NOESY and HSQC - 2  
Lecture 22 - Introduction to NOESY and HSQC - 3  
Lecture 23 - Introduction to NOESY and HSQC - 4  
Lecture 24 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 1  
Lecture 25 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 2  
Lecture 26 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 3  
Lecture 27 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 4  
Lecture 28 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 5  
Lecture 29 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 6

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

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- Lecture 30 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 7
- Lecture 31 - Determination of Structure and Dynamics of Proteins - 1
- Lecture 32 - Determination of Structure and Dynamics of Proteins - 2
- Lecture 33 - Determination of Structure and Dynamics of Proteins - 3
- Lecture 34 - Determination of Structure and Dynamics of Proteins - 4
- Lecture 35 - Determination of Structure and Dynamics of Proteins - 5
- Lecture 36 - Determination of Structure and Dynamics of Proteins - 6
- Lecture 37 - NMR Analysis of Protein Dynamics - I
- Lecture 38 - NMR Analysis of Protein Dynamics - II
- Lecture 39 - NMR Analysis of Protein Dynamics - III
- Lecture 40 - NMR Analysis of Protein Dynamics - IV
- Lecture 41 - Protein-Ligand and Protein-Protein Interaction
- Lecture 42 - NMR Analysis of Ligand specific parameters in a Protein-Ligand Interaction - I
- Lecture 43 - NMR Analysis of Ligand specific parameters in a Protein-Ligand Interaction - II
- Lecture 44 - NMR Analysis of Protein Specific Parameters in a Protein-Ligand Interaction - I
- Lecture 45 - NMR Analysis of Protein Specific Parameters in a Protein-Ligand Interaction - II
- Lecture 46 - NMR in Drug Design
- Lecture 47 - NMR in Drug Discovery
- Lecture 48 - NMR in Drug metabolism - I
- Lecture 49 - NMR in Drug metabolism - II
- Lecture 50 - NMR in Drug metabolism - III
- Lecture 51 - Probing Protein Dynamics by NMR Spectroscopy - I
- Lecture 52 - Probing Protein Dynamics by NMR Spectroscopy - II
- Lecture 53 - Probing Protein Dynamics by NMR Spectroscopy - III
- Lecture 54 - Probing Protein Dynamics by NMR Spectroscopy - IV
- Lecture 55 - Probing Protein Dynamics by NMR Spectroscopy - V
- Lecture 56 - Basics of solid state NMR spectroscopy - I
- Lecture 57 - Basics of solid state NMR spectroscopy - II
- Lecture 58 - Basics of solid state NMR spectroscopy - III
- Lecture 59 - Basics of solid state NMR spectroscopy - IV
- Lecture 60 - Basics of solid state NMR spectroscopy - V



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

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

Subject Co-ordinator - Prof. M S Balakrishna

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - History of Periodic Table - 1  
Lecture 2 - History of Periodic Table - 2  
Lecture 3 - History of Periodic Table - 3  
Lecture 4 - Introduction to Transition elements - 1  
Lecture 5 - Introduction to Transition elements - 2  
Lecture 6 - Introduction to Transition elements - 3  
Lecture 7 - Introduction to Transition elements - 4  
Lecture 8 - Coordination Theory  
Lecture 9 - Werner's Coordination Theory  
Lecture 10 - Early Bonding Concepts  
Lecture 11 - Valence Bond Theory (VBT) - 1  
Lecture 12 - Valence Bond Theory (VBT) - 2  
Lecture 13 - Background To Crystal Field Theory (CFT)  
Lecture 14 - Crystal Field Theory (CFT) Jahn-Teller Theorem  
Lecture 15 - Crystal Field Theory (CFT) - 1  
Lecture 16 - Crystal Field Theory (CFT) - 2  
Lecture 17 - Ligand Field Theory (LFT) - 1  
Lecture 18 - Ligand Field Theory (LFT) - 2  
Lecture 19 - Ligand Field Theory (LFT) - 3  
Lecture 20 - Ligand Field Theory (LFT) - 4  
Lecture 21 - 18 Electron Rule  
Lecture 22 - 18 Electron Rule  
Lecture 23 - Metal-Metal Multiple Bonds  
Lecture 24 - Metal-Metal Multiple Bonds [Quadruple and Quintuple Bonding]  
Lecture 25 - Preparation of metal Complexes  
Lecture 26 - Preparation of metal Complexes  
Lecture 27 - Classification of ligands by donor atoms  
Lecture 28 - Classification of ligands by donor atoms - Hydrogen  
Lecture 29 - Classification of ligands by donor atoms - Carbon - 1

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- Lecture 30 - Classification of ligands by donor atoms - Carbon - 2
- Lecture 31 - Classification of ligands by donor atoms - Carbon - 3
- Lecture 32 - Classification of ligands by donor atoms - Carbon - 4
- Lecture 33 - Classification of ligands by donor atoms - Nitrogen - 1
- Lecture 34 - Classification of ligands by donor atoms - Nitrogen - 2
- Lecture 35 - Classification of ligands by donor atoms - Nitrogen - 3
- Lecture 36 - Classification of ligands by donor atoms - Oxygen, Phosphorus
- Lecture 37 - Classification of ligands by donor atoms - Phosphorus - 1
- Lecture 38 - Classification of ligands by donor atoms - Phosphorus - 2
- Lecture 39 - Classification of ligands by donor atoms - Phosphorus - 3
- Lecture 40 - Classification of ligands by donor atoms - Halogens
- Lecture 41 - Oxidative addition and reductive elimination reactions - 1
- Lecture 42 - Oxidative addition and reductive elimination reactions - 2
- Lecture 43 - Oxidative addition and reductive elimination reactions - 3
- Lecture 44 - Oxidative addition and reductive elimination reactions - 4
- Lecture 45 - Inorganic Reaction Mechanisms
- Lecture 46 - Inorganic Reaction Mechanisms Square planar complexes
- Lecture 47 - Trans-Effect
- Lecture 48 - Substitution Reactions in Square Planar Complexes, Trans-Effect
- Lecture 49 - Substitution Reactions in Octahedral Complexes
- Lecture 50 - Substitution Reactions in Octahedral Complexes; Stereochemistry of Products
- Lecture 51 - Electron-Transfer Processes
- Lecture 52 - Electron-Transfer Processes
- Lecture 53 - Methods of Characterization UV-Visible Spectroscopy
- Lecture 54 - Methods of Characterization UV-Visible Spectroscopy
- Lecture 55 - UV-Visible Spectroscopy
- Lecture 56 - UV-Visible Spectroscopy
- Lecture 57 - NMR Spectroscopy
- Lecture 58 - NMR Spectroscopy
- Lecture 59 - NMR and IR Spectroscopy
- Lecture 60 - Summary and Conclusion

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Nuclear and Radiochemistry

Subject Co-ordinator - Prof. B.S.Tomar, Prof. P.K.Mohapatra

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Radioactivity  
Lecture 2 - Radioactive decay  
Lecture 3 - Radioactive decay chain  
Lecture 4 - Radioactive equilibria  
Lecture 5 - Nuclear structure and stability  
Lecture 6 - Nuclear force and nuclear properties  
Lecture 7 - Liquid drop model  
Lecture 8 - Applications of Liquid drop model  
Lecture 9 - Nuclear Shell model  
Lecture 10  
Lecture 11 - Alpha decay  
Lecture 12 - Beta decay  
Lecture 13 - Gamma decay  
Lecture 14 - Interaction of radiations with matter  
Lecture 15 - Interaction of fast electrons with matter  
Lecture 16 - Interaction of electromegnetic radiations with matter  
Lecture 17 - Principles of radiation detectors  
Lecture 18 - Gas filled detectors  
Lecture 19 - Scintillator detectors  
Lecture 20 - Semiconductor detectors  
Lecture 21  
Lecture 22  
Lecture 23  
Lecture 24  
Lecture 25  
Lecture 26 - Compound nucleus reactions  
Lecture 27 - Nuclear fission  
Lecture 28 - Nuclear fusion  
Lecture 29 - Production of radioisotopes using neutrons

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- Lecture 30 - Radioisotope production using charged particles
- Lecture 31 - Radiochemical practices
- Lecture 32 - Radioanalytical techniques and applications
- Lecture 33 - Nuclear analytical techniques
- Lecture 34 - Applications of neutron activation analysis
- Lecture 35 - Ion beam analysis
- Lecture 36 - Nuclear reaction analysis and particle induced gamma emission
- Lecture 37 - Nuclear Probes: Positron annihilation spectroscopy
- Lecture 38 - Perturbed angular correlation
- Lecture 39 - Radioisotope applications in healthcare
- Lecture 40 - Radioisotope applications in Industry, agriculture and food technology
- Lecture 41 - History of actinides
- Lecture 42 - Actinide concept
- Lecture 43 - Actinide ionic species in water
- Lecture 44 - Actinide hydration and Hydrolysis
- Lecture 45 - pH-pE concept
- Lecture 46 - Ln/An absorption spectroscopy - I
- Lecture 47 - Ln/An absorption spectroscopy - II
- Lecture 48 - Ln/An emission spectroscopy - I
- Lecture 49 - Ln/An emission spectroscopy - II
- Lecture 50 - Solution chemistry Actinides
- Lecture 51 - Complexation of actinides - I
- Lecture 52 - Complexation of actinides - II
- Lecture 53 - Solvent extraction of actinides - I
- Lecture 54 - Solvent extraction of actinides - II
- Lecture 55 - Actinide partitioning
- Lecture 56 - Analytical chemistry of actinides
- Lecture 57 - Transactinides
- Lecture 58 - Fast radiochemical separations
- Lecture 59 - Actinides in the environment
- Lecture 60 - Actinides sorption and migration

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Fundamentals of Statistical Thermodynamics

Subject Co-ordinator - Prof. Nand Kishore

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - General introduction to Statistical Thermodynamics  
Lecture 2 - Configuration and Weights  
Lecture 3 - Configuration and Weights (Continued...)  
Lecture 4 - Boltzmann Distribution  
Lecture 5 - The Molecular Partition Function  
Lecture 6 - The Molecular Partition Function of a uniform ladder of energy levels  
Lecture 7 - The partition function for a particle of mass  $m$  free to move in a 1D container  
Lecture 8 - The partition function for a particle of mass  $m$  free to move in a 3D container  
Lecture 9 - Numerical Problems Set-I (based on partition function)  
Lecture 10 - Numerical Problems Set-II  
Lecture 11 - The Internal Energy  
Lecture 12 - Obtaining expression for  $\beta$   
Lecture 13 - The Statistical Entropy  
Lecture 14 - Connecting partition function with entropy  
Lecture 15 - Solving numerical problems based on Internal energy and Entropy  
Lecture 16 - Solving numerical problems based on Internal energy and Entropy  
Lecture 17 - Negative Temperature  
Lecture 18 - Further discussion on  $q$  (Partition function),  $U$  (Internal energy) and  $S$  (Entropy)  
Lecture 19 - The Canonical Partition Function  
Lecture 20 - Relating Canonical Partition Function Internal Energy and Entropy  
Lecture 21 - Recovering molecular partition function  $q$  from canonical partition function  $Q$   
Lecture 22 - Entropy of a monatomic gas  
Lecture 23 - Further discussion on entropy of a monatomic gas - I  
Lecture 24 - Further discussion on entropy of a monatomic gas - II  
Lecture 25 - The Thermodynamic Functions (Pressure)  
Lecture 26 - The Thermodynamic Functions (Enthalpy)  
Lecture 27 - The Thermodynamic Functions (The Gibbs Energy)  
Lecture 28 - The Thermodynamic Functions (The Molecular Partition Function)  
Lecture 29 - The Rotational Contribution to Molecular Partition Function

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- Lecture 30 - The Rotational Contribution to Molecular Partition Function (Nonlinear Rotor)
- Lecture 31 - The Rotational Contribution to Molecular Partition Function
- Lecture 32 - Rotational Partition Function
- Lecture 33 - Vibrational Partition Function - I
- Lecture 34 - Vibrational Partition Function - II
- Lecture 35 - Vibrational Partition Function - Applications
- Lecture 36 - Electronic Partition Function
- Lecture 37 - Mean Energies
- Lecture 38 - Mean Energies (Continued...)
- Lecture 39 - Heat Capacity
- Lecture 40 - Heat Capacity (Continued...)
- Lecture 41 - Mean Energies (Applications)
- Lecture 42 - Problem Solving
- Lecture 43 - Residual Entropy
- Lecture 44 - Residual Entropy (Continued...)
- Lecture 45 - Relation between equilibrium constant  $K$  and partition function  $q$
- Lecture 46 - Relation between equilibrium constant  $K$  and partition function  $q$  (Continued...)
- Lecture 47 - Relation between equilibrium constant  $K$  and partition function  $q$  (Applications-1)
- Lecture 48 - Relation between equilibrium constant  $K$  and partition function  $q$  (Applications-2)
- Lecture 49 - Contributions to equilibrium constant
- Lecture 50 - Contributions to equilibrium constant (Continued...)
- Lecture 51 - Contributions to equilibrium constant (Continued...) and Problems Solving
- Lecture 52 - Problem Solving
- Lecture 53 - Problem Solving (Continued...)
- Lecture 54 - Equations of state
- Lecture 55 - Bose-Einstein Statistics
- Lecture 56 - Problem Solving
- Lecture 57 - FERMI-DIRAC Statistics
- Lecture 58 - Radial Distribution Function
- Lecture 59 - Recap - 1
- Lecture 60 - Recap - 2

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Interpretative Molecular Spectroscopy

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

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Various Analytical Techniques and their applications
- Lecture 2 - Introduction to  $^1\text{H}$  NMR Spectroscopy
- Lecture 3 - NMR signals and magnetic shielding
- Lecture 4 - Introduction to the concept of Chemical Shifts in NMR spectra
- Lecture 5 - Chemical Shifts for different type of protons
- Lecture 6 -  $N+1$  Rule and Pascal's Triangle
- Lecture 7 - Coupling constants for different types of molecules
- Lecture 8 - Second Order Coupling
- Lecture 9 - Introduction to  $^{13}\text{C}$  NMR Spectroscopy
- Lecture 10 - Introduction to  $^{31}\text{P}$  NMR Spectroscopy
- Lecture 11 - Chemical Shift Range in  $^{31}\text{P}$  NMR Spectroscopy
- Lecture 12 - Examples explaining Multinuclear NMR Spectroscopy - 1
- Lecture 13 - Examples explaining Multinuclear NMR Spectroscopy - 2
- Lecture 14 - Examples explaining Multinuclear NMR Spectroscopy - 3
- Lecture 15 - Examples explaining Multinuclear NMR Spectroscopy - 4
- Lecture 16 - Examples explaining Multinuclear NMR Spectroscopy - 5
- Lecture 17 - Monitoring reaction through  $^{31}\text{P}$  NMR Spectroscopy
- Lecture 18 -  $^{19}\text{F}$ ,  $^{14}\text{N}$  and  $^{15}\text{N}$  NMR Spectroscopy
- Lecture 19 -  $^6\text{Li}$  and  $^7\text{Li}$  NMR Spectroscopy
- Lecture 20 -  $^{11}\text{B}$ ,  $^{10}\text{B}$  and  $^{199}\text{Hg}$  NMR Spectroscopy
- Lecture 21 - Introduction to UV Spectroscopy
- Lecture 22 - Types of Electronic Transitions and Woodward-Fieser Rules
- Lecture 23 - Spin Orbit Coupling and Term Symbols
- Lecture 24 - Ground State Term Symbol
- Lecture 25 - Calculating microstates for different electronic configuration
- Lecture 26 - Selection Rule of Electronic Transition
- Lecture 27 - Orgel Level Diagrams
- Lecture 28 - Racah Parameters and Tanabe-Sugano Diagrams
- Lecture 29 - Introduction to IR Spectroscopy - 1

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- Lecture 30 - Introduction to IR Spectroscopy - 2
- Lecture 31 - Interpretation of IR Spectra
- Lecture 32 - IR stretching frequencies for various functional groups
- Lecture 33 - Hook's Law - Numericals
- Lecture 34 - IR Spectra of carbonyl compounds - 1
- Lecture 35 - IR Spectra of carbonyl compounds - 2
- Lecture 36 - Numerical Problems related to IR Spectroscopy - 1
- Lecture 37 - Numerical Problems related to IR Spectroscopy - 2
- Lecture 38 - Introduction to Mass Spectrometry
- Lecture 39 - Isotope Peaks in Mass Spectrometry
- Lecture 40 - Hydrogen deficiency Index
- Lecture 41 - EI Mass Spectra of various molecules - 1
- Lecture 42 - EI Mass Spectra of various molecules - 2
- Lecture 43 - EI Mass Spectra of various molecules - 3
- Lecture 44 - Types of Mass Spectrometry
- Lecture 45 - Introduction to EPR Spectroscopy - 1
- Lecture 46 - Introduction to EPR Spectroscopy - 2
- Lecture 47 - Hyperfine Interactions
- Lecture 48 - Examples of Hyperfine Interactions
- Lecture 49 - Introduction to Mössbauer Spectroscopy (Möss)
- Lecture 50 - More discussion, problems and solutions (Möss)
- Lecture 51 - Problems and Solutions - 1
- Lecture 52 - Problems and Solutions - 2
- Lecture 53 - Problems and Solutions - 3
- Lecture 54 - Problems and Solutions - 4
- Lecture 55 - Problems and Solutions - 5
- Lecture 56 - Rule of Thirteen and Nitrogen Rule
- Lecture 57 - Problems and Solutions - 6
- Lecture 58 - Problems and Solutions - 7
- Lecture 59 - Problems and Solutions - 8
- Lecture 60 - Summary and conclusion



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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Many Body Methods in Quantum Chemistry

Subject Co-ordinator - Prof. Sourav Pal, Prof. Achintya Kumar Dutta

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Failure of classical mechanics  
Lecture 2 - Postulates of quantum mechanics  
Lecture 3 - Postulate 5 and 6  
Lecture 4 - Overview of exactly solvable system  
Lecture 5 - Introduction to many electron problem  
Lecture 6 - Non-interacting and interacting quantum particles  
Lecture 7 - Spin orbital concept  
Lecture 8 - Slater determinant introduction  
Lecture 9 - Form of exact wave function for interacting particles  
Lecture 10 - A brief introduction to Configuration Interaction (CI)  
Lecture 11 - Variational method and Rayleigh-Ritz variation  
Lecture 12 - Linear variation method  
Lecture 13 - Hartree-Fock theory introduction  
Lecture 14 - Slater rules for matrix elements  
Lecture 15 - Spin integrated for closed shell determinant  
Lecture 16 - Examples of spin integrated determinants  
Lecture 17 - Introduction to Lagrange variation  
Lecture 18 - General lagrange variation  
Lecture 19 - Lagrange variation to minimize the the Hartree-Fock energy  
Lecture 20 - Non-canonical HF equation  
Lecture 21 - Interpretation of coulomb and exchange terms  
Lecture 22 - Unitary transformation of non-canonical HF equation  
Lecture 23 - Canonical Hartree-Fock equation  
Lecture 24 - Koopmans' approximation for IP  
Lecture 25 - Koopmans' approximation for EA  
Lecture 26 - Spin integrated Hartree-Fock for closed shell system (RHF)  
Lecture 27 - Molecular Hartree-Fock introduction  
Lecture 28 - Hartree-Fock Rothaan Hall equation  
Lecture 29 - Symmetry of two electron integrals

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

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- Lecture 30 - HF Roothan equation in terms of atomic orbitals
- Lecture 31 - Koopmans' IP for molecules
- Lecture 32 - Koopmans' EA for molecules
- Lecture 33 - Roothaan equation in orthonormalized basis
- Lecture 34 - Review of Hartree-Fock theory
- Lecture 35 - Charge density, Bond order and Population analysis
- Lecture 36 - Dipole Moment
- Lecture 37 - Introduction to basis set
- Lecture 38 - Dunning and Pople basis set
- Lecture 39 - Polarization and diffuse function
- Lecture 40 - Brillouin's theorem and Slater's rule type-2
- Lecture 41 - Slater rule type-2
- Lecture 42 - Spin adapted determinant
- Lecture 43 - Dissociation of Hydrogen molecule problem
- Lecture 44 - Inadequacies of restricted Hartree-Fock theory
- Lecture 45 - Hartree-Fock perturbation theory and correlation correction
- Lecture 46 - Hartree-Fock perturbation theory (Continued...)
- Lecture 47 - Introduction of 2nd order perturbation theory
- Lecture 48 - Intermediate normalization and an expression for the Correlation energy
- Lecture 49 - Slater rule -3 and derivation of 2-nd order perturbation energy
- Lecture 50 - Physical insight of pair correlation theory
- Lecture 51 - Introduction to configuration interaction (CI)
- Lecture 52 - Determine the parameter of CI
- Lecture 53 - Construction of CIS hamiltonian matrix
- Lecture 54 - Importance of doubly excited determinants in correlation contribution
- Lecture 55 - Intermediate normalization and an expression for the Correlation energy
- Lecture 56 - CI equation in terms of Normal-Ordered hamiltonian
- Lecture 57 - Doubly excited CI function (D-CI)
- Lecture 58 - Matrix structure of CISD (singly and doubly excited CI)
- Lecture 59 - Some illustrative example
- Lecture 60 - Effects of singly excited determinant in the calculation
- Lecture 61 - D-CI for non-interacting hydrogen molecules
- Lecture 62 - Size consistency problem in truncated CI
- Lecture 63 - N-dependence of D-CI correlation energy
- Lecture 64 - problem of truncating CI
- Lecture 65 - Introduction of second quantization operator in quantum mechanics
- Lecture 66 - Creation and annihilation operator and their properties
- Lecture 67 - Operators in second quantization
- Lecture 68 - Some basic examples related with second quantization operator

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

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- Lecture 69 - Hole-Particle formalism
- Lecture 70 - Hugenholtz rule for diagrammatic construction of MP perturbation theory
- Lecture 71 - Linked cluster diagram
- Lecture 72 - Energy expression for higher order Moller-Plasset perturbation theory
- Lecture 73 - Diagrammatic representation of MP3 energy and some practice problem
- Lecture 74 - Overview of the some other correlation calculation method
- Lecture 75 - A brief introduction to Coupled cluster theory

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

NPTEL Video Course - Chemistry and Biochemistry - Bio-Physical Chemistry

Subject Co-ordinator - Dr. P.K. Chowdhury

Co-ordinating Institute - IIT - Delhi

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

Lecture 1 - A Course on Bio-physical Chemistry  
Lecture 2 - Protein Structure  
Lecture 3 - Secondary Structure of Proteins  
Lecture 4 - Secondary Structure of Proteins (Continued...)  
Lecture 5 - Tertiary Structure  
Lecture 6 - Forces in Protein Folding  
Lecture 7 - Forces in Protein Folding (Continued...)  
Lecture 8 - Electrostatics (Continued...)  
Lecture 9 - Intermolecular Interactions  
Lecture 10 - Dipole-Dipole Interaction  
Lecture 11 - Electrostatics (Continued...)  
Lecture 12 - Hydrophobic Effect  
Lecture 13 - Hydrophobic Effect (Continued...)  
Lecture 14 - Hydrogen Bonding  
Lecture 15 - Protein Stability Curves  
Lecture 16 - Thermodynamics of Protein Unfolding  
Lecture 17 - Thermodynamics of Protein Unfolding (Continued...)  
Lecture 18 - Mechanism of Chemical Denaturation  
Lecture 19 - Pressure Induced Denaturation (The P-T Diagram)  
Lecture 20 - Protein Folding Pathways and Energy Landscapes  
Lecture 21 - Diffusion  
Lecture 22 - Diffusion (Continued...)  
Lecture 23 - Diffusion (Continued...)  
Lecture 24 - Langevin Equation and Brownian Motion  
Lecture 25 - Langevin Equation and Brownian Motion (Continued...)  
Lecture 26 - Langevin Equation and Brownian Motion (Continued...)  
Lecture 27 - Protein Folding  
Lecture 28 - Protein Folding  
Lecture 29 - Protein Folding

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- Lecture 30 - Protein Folding
- Lecture 31 - Protein Folding Kinetics
- Lecture 32 - Protein Folding Kinetics
- Lecture 33 - Protein Folding Kinetics
- Lecture 34 - Protein Folding Kinetics
- Lecture 35 - Experimental Tools
- Lecture 36 - Spectroscopy
- Lecture 37 - Spectroscopy
- Lecture 38 - Electronic Spectroscopy Absorption and Fluorescence
- Lecture 39 - Fluorescence
- Lecture 40 - Fluorescence Quenching
- Lecture 41 - Infrared Spectroscopy of Proteins
- Lecture 42 - Infrared Spectroscopy of Proteins (Continued...)

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Spectroscopic Techniques for Pharmaceutical and Biopharmaceuticals

Subject Co-ordinator - Dr. Shashank Deep

Co-ordinating Institute - IIT - Delhi

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

Lecture 1 - Introduction to Spectroscopy - I  
Lecture 2 - Introduction to Spectroscopy - II  
Lecture 3 - Introduction to Spectroscopy - III  
Lecture 4 - Introduction to Spectroscopy - IV  
Lecture 5 - Introduction to Spectroscopy - V  
Lecture 6 - Introduction to Spectroscopy - VI  
Lecture 7 - Rotational, rotational Raman Spectroscopy theory and Application - I  
Lecture 8 - Rotational, rotational Raman Spectroscopy theory and Application - II  
Lecture 9 - Vibrational Spectroscopy Theory and Application - I  
Lecture 10 - Vibrational, Rotational-Vibrational, Raman Spectroscopy - II  
Lecture 11 - Vibrational, Rotational-Vibrational, Raman Spectroscopy - III  
Lecture 12 - Problems on Rotational, Vibrational and Raman Spectroscopy  
Lecture 13 - Atomic Spectroscopy - I  
Lecture 14 - Atomic Spectroscopy - II  
Lecture 15 - Atomic Spectroscopy - III  
Lecture 16 - Atomic Spectroscopy - IV  
Lecture 17 - Atomic and Molecular Spectroscopy  
Lecture 18 - Electronic Spectra of Diatomic Molecules and UV-Vis Spectroscopy  
Lecture 19 - UV-Visible Spectroscopy of Conjugated Molecules  
Lecture 20 - UV-Vis Spectroscopy and its Applications - I  
Lecture 21 - UV-Vis Spectroscopy and its Applications - II  
Lecture 22 - UV-Vis and Fluorescence Spectroscopy  
Lecture 23 - Fluorescence Spectroscopy (Continued...)  
Lecture 24 - Application of Fluorescence Spectroscopy  
Lecture 25 - Application of Steady-State Fluorescence  
Lecture 26 - Time-resolved Fluorescence Spectroscopy  
Lecture 27 - Microscopy  
Lecture 28 - Contrast in Microscopy, Fluorescence Microscopy  
Lecture 29 - Fluorescence Microscopy and Application

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- Lecture 30 - Principle of NMR
- Lecture 31 - NMR data processing and Chemical shift
- Lecture 32 - Structure Informations from NMR
- Lecture 33 - Structure Calculation and 2D-NMR Spectroscopy
- Lecture 34 - Mass Spectroscopy

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Introductory Non-Linear Dynamics

Subject Co-ordinator - Prof. Ramakrishna Ramaswamy

Co-ordinating Institute - IIT - Delhi

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

- Lecture 1 - Introduction, Stability, Phase Space and Invariant Sets - 1
- Lecture 2 - Introduction, Stability, Phase Space and Invariant Sets - 2
- Lecture 3 - Introduction, Stability, Phase Space and Invariant Sets - 3
- Lecture 4 - Maps and Flows. Simple Examples of Dynamics Systems - 1
- Lecture 5 - Maps and Flows. Simple Examples of Dynamics Systems - 2
- Lecture 6 - Logistic map. Simple Examples of Bifurcations
- Lecture 7 - Bifurcation Diagrams. Period 3 Implies Chaos. Characterizing Chaos
- Lecture 8 - Characterizing The Period-Doubling Route to Chaos
- Lecture 9 - Lyapunov Exponents; Invariant measures
- Lecture 10 - Intermittency. Crises
- Lecture 11 - Fractals
- Lecture 12 - Chaos in Flows. The Lorenz and Rossler Systems
- Lecture 13 - The Baker and Horseshoe Maps
- Lecture 14 - Hamiltonian Chaos - 1
- Lecture 15 - Hamiltonian Chaos - 2



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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Principles of Organic Synthesis

Subject Co-ordinator - Prof. T. Punniyamurthy

Co-ordinating Institute - IIT - Guwahati

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

Lecture 1 - Aldol Reaction

Lecture 2 - Perkin, Claisen and Thorpe Reactions

Lecture 3 - Reaction of Enolates

Lecture 4 - Mannich Reaction

Lecture 5 - Reaction of Alkenes and Carbonyl Compounds

Lecture 6 - Friedel-Crafts and Prins Reactions

Lecture 7 - Grignard Reagents

Lecture 8 - Organolithium Reagents

Lecture 9 - Organocopper, Organozinc and Organomercury Reagents

Lecture 10 - Ritter Reaction and Gabriel Synthesis

Lecture 11 - Reactions of imines and enamines, synthesis of alkaloids and amino acids

Lecture 12 - Reactions of electrophilic and nucleophilic nitrogens, synthesis of amino acids and peptides

Lecture 13 - Principles, effect of substituents and carbon-carbon bond formation

Lecture 14 - Formylation/acylation and related reactions

Lecture 15 - Nitration, Sulfonation and other reactions

Lecture 16 - Principle, Substitution mechanism and reactions of Benzyne

Lecture 17 - Schiemann Reaction, Ullmann reaction and Stephens-Castro coupling

Lecture 18 - Ziegler Alkylation, Chichibabin Reaction, Von Richter Rearrangement, Smiles Rearrangement, Bamford-Stevens Reaction

Lecture 19 - Preparation, properties and reactions

Lecture 20 - Coupling reactions, Japp-Klingemann reaction and Tiffeneau-Demjanov rearrangement

Lecture 21 - Applications of diazonium salts

Lecture 22 - Wagner-Meerwein rearrangement, Pinacol rearrangement, Benzilic acid rearrangement and Arndt-Eistert reaction

Lecture 23 - Rearrangement of halogen, oxygen, sulfur and nitrogen containing centre

Lecture 24 - Rearrangement to electron-rich carbon

Lecture 25 - Reactivity and several reactions

Lecture 26 - Reactions of sulfur and silicon containing reagents

Lecture 27 - Preparation and reactions of organoborane and organotin reagents

Lecture 28 - Formation of carbon-carbon and carbon-halogen bonds

Lecture 29 - Cu, Mn, Sm, and Sn Based Reactions, Acyloin Condensation

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Lecture 30 - C-N, C-O bond formation and decarboxylation

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Reagents in Organic Synthesis

Subject Co-ordinator - Prof.Subhas Chandra

Co-ordinating Institute - IIT - Guwahati

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

Lecture 1 - Chromium Based Reagents for Oxidation  
Lecture 2 - Non-metal based Reagents for Oxidation  
Lecture 3 - Organic Peroxides  
Lecture 4 - Oxidation Mediated by DDQ, CAN and SeO<sub>2</sub>  
Lecture 5 - Oxidation Mediated by Mn and Ag  
Lecture 6 - Oxidation by Ru, Hypervalent Iodine, Al and Na based Reagents  
Lecture 7 - Na and Li Metal based Reduction  
Lecture 8 - Hydride based Reduction  
Lecture 9 - Hydrogenation  
Lecture 10 - Al, Zn and Li Based Reagents for Reduction  
Lecture 11 - Reduction With Boranes, Diimide and Trialkylsilanes  
Lecture 12 - Li Based Reagents in Organic Synthesis  
Lecture 13 - Mg and Na Based Reagents in Organic Synthesis  
Lecture 14 - B Based Reagents in Organic Synthesis  
Lecture 15 - B and Al Based Reagents in Organic Synthesis  
Lecture 16 - S Based Reagents in Organic Synthesis  
Lecture 17 - P Based Reagents in Organic Synthesis  
Lecture 18 - Si and Pb Based Reagents in Organic Synthesis  
Lecture 19 - Sn and Bi Based Reagents in Organic Synthesis  
Lecture 20 - Ti Based Reagents in Organic Synthesis  
Lecture 21 - Ru Based Reagents in Organic Synthesis  
Lecture 22 - Pd Based Reagents in Organic Synthesis  
Lecture 23 - Cu Based Reagents in Organic Synthesis  
Lecture 24 - Cr and Mn Based Reagents in Organic Synthesis  
Lecture 25 - Zn and Hg Based Reagents in Organic Synthesis  
Lecture 26 - Au Based Reagents in Organic Synthesis  
Lecture 27 - Fe and Co Based Reagents in Organic Synthesis  
Lecture 28 - Ag and Rh Based Reagents in Organic Synthesis  
Lecture 29 - Ni, Pt and Ir Based Reagents in Organic Synthesis

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

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- Lecture 30 - Introduction to Lanthanides and Sm Based Reagents
- Lecture 31 - Samarium(II) Iodide Based Reagents in Organic Synthesis
- Lecture 32 - Sm and Yb Based Reagents in Organic Synthesis

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Thermodynamics: Classical to Statistical

Subject Co-ordinator - Prof. Sandip Paul

Co-ordinating Institute - IIT - Guwahati

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

- Lecture 1 - Concepts of heat and work; First Law of Thermodynamics
- Lecture 2 - Concepts of enthalpy and heat capacity
- Lecture 3 - Introduction to entropy
- Lecture 4 - Calculation of entropy for various processes
- Lecture 5 - Gibbs and Helmholtz free energy
- Lecture 6 - Introduction to chemical potential
- Lecture 7 - Clapeyron equation and phase transition; concept of fugacity
- Lecture 8 - Calculation of fugacity; free energy of mixing
- Lecture 9 - Partial molar quantities; excess thermodynamic quantities
- Lecture 10 - Concept of activity and activity coefficients; Debye-Huckel limiting law
- Lecture 11 - Phase Diagram of one component systems
- Lecture 12 - Phase Diagram of two component systems
- Lecture 13 - Phase Diagram of three component system; one dimensional random walk
- Lecture 14 - Macroscopic and microscopic states; Boltzmann distribution; Canonical partition function
- Lecture 15 - Calculation of different thermodynamical quantities using canonical partition function
- Lecture 16 - Introduction to molecular partition function
- Lecture 17 - Translational, electronic and nuclear partition function
- Lecture 18 - Rotational partition function
- Lecture 19 - Vibrational partition function; Introduction to grand canonical ensemble
- Lecture 20 - Grand canonical distribution; Introduction to microcanonical ensemble
- Lecture 21 - Problems on classical thermodynamics - 1
- Lecture 22 - Problems on classical thermodynamics - 2
- Lecture 23 - Problems on statistical thermodynamics - 1
- Lecture 24 - Problems on statistical thermodynamics - 2
- Lecture 25 - Problems on statistical thermodynamics - 3
- Lecture 26 - Fermi-Dirac and Bose-Einstein statistics
- Lecture 27 - Ideal Fermi gas
- Lecture 28 - Ideal Bose gas; Introduction to Bose-Einstein condensation
- Lecture 29 - Bose-Einstein condensations

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

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- Lecture 30 - Nuclear spin statistics; Ortho- and para-hydrogens
- Lecture 31 - Specific Heats of solids
- Lecture 32 - Problems on statistical thermodynamics - 4
- Lecture 33 - Advance problems - 1
- Lecture 34 - Advance Problems - 2
- Lecture 35 - Advance Problems - 3
- Lecture 36 - Advance Problems - 4
- Lecture 37 - Advance Problems - 5

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Essentials of Biomolecules: Nucleic Acids and Peptides

Subject Co-ordinator - Prof. Lal Mohan Kundu

Co-ordinating Institute - IIT - Guwahati

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

Lecture 1 - Importance of Biomolecules  
Lecture 2 - DNA double helix  
Lecture 3 - DNA and Proteins  
Lecture 4 - Amino acids and Proteins  
Lecture 5 - Protein 3D structures, folding and denaturation  
Lecture 6 - Chemical synthesis pyrimidine nucleobases  
Lecture 7 - Chemical synthesis purine nucleobases, Prebiotic chemistry  
Lecture 8 - Synthesis of nucleosides  
Lecture 9 - Solid phase DNA synthesis  
Lecture 10 - Chemistry and Biology of DNA Replication  
Lecture 11 - Chemistry of Polymerase Chain Reaction  
Lecture 12 - Major components and steps involved in Polymerase chain reaction  
Lecture 13 - DNA sequencing  
Lecture 14 - DNA sequencing  
Lecture 15 - Numerical Problem-1  
Lecture 16 - Sugar Chemistry  
Lecture 17 - Chemistry behind DNA damage and mutation  
Lecture 18 - Chemistry behind DNA damage and mutation  
Lecture 19 - DNA repair  
Lecture 20 - Transcription - The transfer of genetic information from DNA to mRNA  
Lecture 21 - Translation - The transfer of genetic information from mRNA to protein I  
Lecture 22 - Translation - The transfer of genetic information from mRNA to protein II  
Lecture 23 - Role of Ribosome in protein synthesis and the concept of codon  
Lecture 24 - Protein sequencing using Sanger's and Edman's degradation methods  
Lecture 25 - Mass spectroscopy and other sequencing methods for large proteins  
Lecture 26 - Solution phase peptide synthesis  
Lecture 27 - Peptide coupling agents, Solid phase synthesis, peptide based therapeutics  
Lecture 28 - Spectroscopic techniques  
Lecture 29 - Spectroscopic techniques - II and Purification technique-I of biomolecules

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

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- Lecture 30 - Purification techniques - II and Characteriation techniques of biomolecules
- Lecture 31 - Molecular probes
- Lecture 32 - Molecular Probes
- Lecture 33 - Carbohydrate chemistry - I
- Lecture 34 - Carbohydrate chemistry - II
- Lecture 35 - Carbohydrate chemistry - III



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

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

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

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Lecture 30 - Mathematics for Chemistry  
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

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

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  
Lecture 23 - Advance Analytical Course  
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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## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

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Lecture 30 - Advance Analytical Course  
Lecture 31 - Advance Analytical Course  
Lecture 32 - Advance Analytical Course  
Lecture 33 - Advance Analytical Course  
Lecture 34 - Advance Analytical Course  
Lecture 35 - Advance Analytical Course  
Lecture 36 - Advance Analytical Course  
Lecture 37 - Advance Analytical Course  
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  
Lecture 2  
Lecture 3  
Lecture 4  
Lecture 5  
Lecture 6  
Lecture 7  
Lecture 8  
Lecture 9  
Lecture 10  
Lecture 11  
Lecture 12  
Lecture 13  
Lecture 14  
Lecture 15  
Lecture 16  
Lecture 17  
Lecture 18  
Lecture 19  
Lecture 20  
Lecture 21  
Lecture 22  
Lecture 23  
Lecture 24  
Lecture 25  
Lecture 26  
Lecture 27  
Lecture 28  
Lecture 29

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

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Lecture 30  
Lecture 31  
Lecture 32  
Lecture 33  
Lecture 34  
Lecture 35  
Lecture 36  
Lecture 37  
Lecture 38  
Lecture 39  
Lecture 40



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

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 & Variation of parameters

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

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- 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

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

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

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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

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

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  
Lecture 3  
Lecture 4  
Lecture 5  
Lecture 6  
Lecture 7  
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Lecture 25  
Lecture 26  
Lecture 27  
Lecture 28  
Lecture 29

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Lecture 30  
Lecture 31  
Lecture 32  
Lecture 33  
Lecture 34  
Lecture 35  
Lecture 36  
Lecture 37  
Lecture 38  
Lecture 39  
Lecture 40

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

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



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

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

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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 - NOC:Solid State Chemistry

Subject Co-ordinator - Prof. Madhav Ranganathan

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - Nature of solid state and the solid state materials  
Lecture 2 - Thermodynamics of solids  
Lecture 3 - Crystallisation Kinetics  
Lecture 4 - Synthetic Strategy  
Lecture 5 - Review of week 1 and Practice problems  
Lecture 6 - Unit Cells  
Lecture 7 - Conventional Unit Cell and Primitive Unit Cell  
Lecture 8 - Bravais Lattices  
Lecture 9 - Bravais Lattices, Basis and crystal  
Lecture 10 - Summary of week 2 and Practices Problems  
Lecture 11 - Symmetry In Crystals, Point Symmetries  
Lecture 12 - Reflections, Inversions and Rotoinversions  
Lecture 13 - Schonflies and Hermann-Mauguin Conventions  
Lecture 14 - Fractional Coordinates, Planer Visualization  
Lecture 15 - Review of week 3 And Practice Problems  
Lecture 16 - Combining symmetry operations, translational symmetries  
Lecture 17 - Screw Axis  
Lecture 18 - Glide Planes  
Lecture 19 - Symmetry and Symmetry Notations  
Lecture 20 - Summary of week 4 and Practice Problems  
Lecture 21 - Crystal Systems  
Lecture 22 - Crystal Systems and Unit Cells  
Lecture 23 - Point Groups  
Lecture 24 - Space Groups  
Lecture 25 - Week 5 Summary and Practice Problems  
Lecture 26 - 32 Crystal Classes Based on Symmetry  
Lecture 27 - Notation for 32 Crystal Classes  
Lecture 28 - Short Form of Hermann-Mauguin Notations  
Lecture 29 - Hermann - Mauguin notation for Space Groups

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

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- Lecture 30 - Summary and Practice Problems
- Lecture 31 - Coordination number, Voids
- Lecture 32 - Lattice Imperfections and Crystals
- Lecture 33 - Line Planner and Bulk defects and crystals
- Lecture 34 - Thermodynamics of defects in crystals
- Lecture 35 - Review of Week 7, Practice Problems
- Lecture 36 - Miller Planes, Miller Indices
- Lecture 37 - Miller Indices for Hexagonal Systems, Distance between Planes
- Lecture 38 - X-ray diffraction, Bragg's Law, Reciprocal Lattice
- Lecture 39 - Reciprocal Lattice, XRD instrumentation
- Lecture 40 - Review of week 8, Practice Problems
- Lecture 41 - XRD - Analysis of Pattern
- Lecture 42 - Geometric Structure Factor - Missing Peaks
- Lecture 43 - X-Ray Crystallography
- Lecture 44 - Electron Microscopy
- Lecture 45 - Review of Week 9. Practice Problems
- Lecture 46 - Closed - Packed Structures and Voids
- Lecture 47 - Crystal Structures of Binary Compounds
- Lecture 48 - Perovskites and Spinals
- Lecture 49 - Space filling Polyhedra, Alloys
- Lecture 50 - Summary of Week 10 and Practice Problems
- Lecture 51 - Free electron Models
- Lecture 52 - Bloch Theorem
- Lecture 53 - Band Theory of Solids
- Lecture 54 - Bands in Higher Dimensions
- Lecture 55 - Summary of Week 11 and Practice Problems
- Lecture 56 - More about Band Theory, Crystal Momentum
- Lecture 57 - Density of States
- Lecture 58 - Metals, Insulators and Semiconductors
- Lecture 59 - Band Gap and Optical Properties
- Lecture 60 - Summary of Week 12 and Practice Problems

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

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

Subject Co-ordinator - Prof. S. P. Rath

Co-ordinating Institute - IIT - Kanpur

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

Lecture 1 - General Introduction and Prospects  
Lecture 2 - Metals in Biology  
Lecture 3 - Metals in Biology  
Lecture 4 - Metals in Biology  
Lecture 5 - Metals in Biology  
Lecture 6 - Design Principles Used in Chemical Biology  
Lecture 7 - Design Principles Used in Chemical Biology  
Lecture 8 - Design Principles Used in Chemical Biology  
Lecture 9 - Design Principles Used in Chemical Biology  
Lecture 10 - Life with Oxygen  
Lecture 11 - Life with Oxygen  
Lecture 12 - Life with Oxygen  
Lecture 13 - Life with Oxygen  
Lecture 14 - Life with Oxygen  
Lecture 15 - Life with Oxygen  
Lecture 16 - Life with Oxygen  
Lecture 17 - Life with Oxygen  
Lecture 18 - Life with Oxygen  
Lecture 19 - Metals in Medicine  
Lecture 20 - Metals in Medicine

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Chemistry and Physics of Surfaces and Interfaces

Subject Co-ordinator - Prof. Thiruvancheril G. Gopakumar

Co-ordinating Institute - IIT - Kanpur

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

- Lecture 1 - Intro-Chemistry and Physics of Surfaces and Interfaces
- Lecture 2 - Historic perspective to surface science
- Lecture 3 - Creating surfaces from bulk lattices
- Lecture 4 - Reconstruction of surfaces
- Lecture 5 - Hexagonal lattice and miller bravais indices
- Lecture 6 - Introduction to ultra-high Vacuum and Preparation of Clean Surfaces
- Lecture 7 - Adsorption and the Energetic of Adsorption
- Lecture 8 - Nomenclature and types of Adlayers
- Lecture 9 - Thermal Desorption Spectroscopy
- Lecture 10 - Different types of Preparation methods for Thin Films
- Lecture 11 - Examples of PVD and CVD
- Lecture 12 - Moire Pattern at Solid-Solid Interface
- Lecture 13 - Growth Modes of Adlayers
- Lecture 14 - Energies that Control the Growth of Adlayers
- Lecture 15 - Kinetic and Thermodynamic Control in Adlayer Growth
- Lecture 16 - Molecular Adsorbates: Preparation
- Lecture 17 - Molecular Adsorbates: Factors Controlling Molecular Adlayer Formation - I
- Lecture 18 - Molecular Adsorbates: Factors Controlling Molecular Adlayer Formation - II
- Lecture 19 - Molecular Adsorbates: Factors Controlling Molecular Adlayer Formation - III
- Lecture 20 - Scanning Tunneling Microscopy
- Lecture 21 - Tip-vacuum Tunneling Junction
- Lecture 22 - Scanning Tunneling Spectroscopy - I
- Lecture 23 - Scanning Tunneling Spectroscopy - II
- Lecture 24 - Scanning Tunneling Spectroscopy: Applications - I
- Lecture 25 - Scanning Tunneling Spectroscopy: Applications - II
- Lecture 26 - Imaging Molecules and Atom Manipulation on Surfaces
- Lecture 27 - Single Molecule Manipulation on Surfaces
- Lecture 28 - Inelastic Tunneling Spectroscopy
- Lecture 29 - Ultra-violet Photo-electron Spectroscopy (UPS)

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- Lecture 30 - Ultra-violet Photo-electron Spectroscopy (UPS): Applications
- Lecture 31 - X-ray Photo-electron Spectroscopy (XPS)
- Lecture 32 - X-Ray Photo-electron Spectroscopy (XPS): Applications - 1
- Lecture 33 - X-Ray Photo-electron Spectroscopy (XPS): Applications - 2
- Lecture 34 - 2D Molecular Materials on Surface - 1
- Lecture 35 - 2D Molecular Materials on Surface - 2
- Lecture 36 - Atomic Force Microscopy (AFM) - I
- Lecture 37 - Atomic Force Microscopy (AFM) - II
- Lecture 38 - Atomic Force Microscopy (AFM) - III
- Lecture 39 - Dynamics of Atoms on Surfaces
- Lecture 40 - Summary

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

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

Subject Co-ordinator - Prof. Parimal Kanti Bharadwaj

Co-ordinating Institute - IIT - Kanpur

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

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

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Lecture 30  
Lecture 31  
Lecture 32  
Lecture 33  
Lecture 34  
Lecture 35  
Lecture 36  
Lecture 37  
Lecture 38  
Lecture 39  
Lecture 40

## 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

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

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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 -  $^{15}\text{N}$  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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## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

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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

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

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

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

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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

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

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

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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 - I  
Lecture 2 - Amino Acid - II  
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 - Enzyme Mechanisms - I  
Lecture 11 - Enzyme Mechanisms - II  
Lecture 12 - Myoglobin and Hemoglobin  
Lecture 13 - Lipids and Membranes - I  
Lecture 14 - Lipids and Membranes - II  
Lecture 15 - Membrane Transport  
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 Lecture Topic List - Created by LinuXpert Systems, Chennai

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

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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:Co-ordination Chemistry (Chemistry of Transition Elements)

Subject Co-ordinator - Prof. Debashis 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 - Co-ordination Equilibria - I  
Lecture 14 - Co-ordination 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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## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

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

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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

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

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

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

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

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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

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

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

Subject Co-ordinator - Prof. Soumya De, Prof. Swagata Dasgupta

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction  
Lecture 2 - Buffers  
Lecture 3 - Introduction to Biochemistry Laboratory Equipments and Safety Measures  
Lecture 4 - Practical Aspects of Making Buffer  
Lecture 5 - Making Tris Buffer (pH=8.2)  
Lecture 6 - Making Phosphate Buffer (100mM)  
Lecture 7 - Amino Acids and Their Properties  
Lecture 8 - Amino Acid Titrations  
Lecture 9 - pI Determination of Glycine  
Lecture 10 - pI Determination of Lysine  
Lecture 11 - Summary  
Lecture 12 - UV and Visible Spectroscopy  
Lecture 13 - Fluorescence Spectroscopy  
Lecture 14 - UV/Visible Spectra of Amino Acids and Proteins  
Lecture 15 - Fluorescence Spectra of Amino Acids and proteins  
Lecture 16 - Spectroscopic Techniques Summary  
Lecture 17 - Protein Folding and Denaturation - I  
Lecture 18 - Protein Folding and Denaturation - II  
Lecture 19 - Urea denaturation of HSA studied by UV/Vis absorbance  
Lecture 20 - Temperature denaturation of HSA studied by UV/Vis absorbance  
Lecture 21 - Denaturation of HSA by GdnHCl studied by Trp fluorescence  
Lecture 22 - Protein Folding and Denaturation Summary  
Lecture 23 - Chromatographic Techniques - I  
Lecture 24 - Chromatographic Techniques - II  
Lecture 25 - Protein Purification by Size Exclusion Chromatography (SEC)  
Lecture 26 - Protein Purification by Affinity Chromatography  
Lecture 27 - Gel Electrophoresis of DNA and Proteins - Part I  
Lecture 28 - Gel Electrophoresis of DNA and Proteins - Part II  
Lecture 29 - Gel Electrophoresis of DNA and Proteins - Part II

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

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- Lecture 30 - Isolation and Characterization of Proteins Part - I
- Lecture 31 - Isolation and Characterization of Proteins Part - II
- Lecture 32 - Isolation and Purification of Proteins
- Lecture 33 - Quality and Quantity of the Isolated Protein
- Lecture 34 - Enzyme Kinetics - I
- Lecture 35 - Enzyme Kinetics - II
- Lecture 36 - Enzyme Kinetics (by using enzyme from apple juice)
- Lecture 37 - Enzyme Kinetics (by using enzyme from apple juice) (Continued...)
- Lecture 38 - Isolation and Characterization of DNA Part - I
- Lecture 39 - Isolation and Characterization of DNA Part - II
- Lecture 40 - Bacterial Culture for Plasmid DNA Isolation
- Lecture 41 - Isolation of Plasmid DNA
- Lecture 42 - Isolation and Characterization of DNA Summary
- Lecture 43 - Basics of rDNA Technology Part - I
- Lecture 44 - Basics of rDNA Technology Part - II
- Lecture 45 - Cloning
- Lecture 46 - DNA Transformation
- Lecture 47 - Protein-Ligand Interaction
- Lecture 48 - Protein-Ligand Interaction (Continued...)
- Lecture 49 - Interaction study of HSA protein with Curcumin and Gallic acid using UV-Vis spectroscopy
- Lecture 50 - Interaction study of HSA protein with Curcumin and Gallic acid using UV-Vis spectroscopy (Continued...)
- Lecture 51 - Analysis of the Structure of Protein ligand complex
- Lecture 52 - Immunoassay Techniques
- Lecture 53 - Western Blotting Technique

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Industrial Inorganic Chemistry

Subject Co-ordinator - Prof. Debashis Ray

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction  
Lecture 2 - Importance of chemical industry, chemicals from materials  
Lecture 3 - Bulk and commodity chemicals  
Lecture 4 - Fine and speciality chemicals  
Lecture 5 - Water  
Lecture 6 - Hydrogen  
Lecture 7 - Inorganic peroxide compounds  
Lecture 8 - Nitrogen compounds  
Lecture 9 - Chloramine and Hydroxylamine  
Lecture 10 - Nitric acid, Ostwald process and uses  
Lecture 11 - Phosphorus and its components  
Lecture 12 - Phosphoric acid salts  
Lecture 13 - Tetrapotassium diphosphate preparation  
Lecture 14 - Hydroxy apatite  
Lecture 15 -  $P_4S_{10}$  and phosphide preparation  
Lecture 16 - Sulfur and copper (I) phosphide  
Lecture 17 - Sulfur compounds and sulfur from  $H_2S$  and  $SO_2$   
Lecture 18 - Sulfuric acid, catalyst and  $S_2Cl_2$ , applications  
Lecture 19 - Sulfur dichloride, thionyl chloride  
Lecture 20 - Thiosulfates and dithionite  
Lecture 21 - Sodium hydroxyl methanesulfinat and hydrogen sulfide  
Lecture 22 - Halogen and halogen compounds  
Lecture 23 - Fluorine and inorganic fluorides  
Lecture 24 - Hydrogen fluoride and aluminum fluoride  
Lecture 25 - Cryolite and other industrially important fluoride salts  
Lecture 26 - Electrochemical fluorination, sulfonyl fluorides  
Lecture 27 - Chloralkali electrolysis  
Lecture 28 - Ion conduction membrane in electrolysis  
Lecture 29 - Hydrochloric acid manufacture

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- Lecture 30 - Bromine and bromine compounds
- Lecture 31 - Hydrogen bromide and alkali bromates
- Lecture 32 - Iodine and iodine compounds
- Lecture 33 - Mineral fertilizers
- Lecture 34 - Nitrogen fertilizer and Urea
- Lecture 35 - Potassium fertilizer
- Lecture 36 - Metals and their compounds
- Lecture 37 - Sodium and its compounds
- Lecture 38 - Potassium and its compounds
- Lecture 39 - Magnesium and its compounds
- Lecture 40 - Calcium and its compounds
- Lecture 41 - Barium and its compounds
- Lecture 42 - Chromium and its compounds
- Lecture 43 - Manganese and its industrially important compounds
- Lecture 44 - Silicon and its compounds
- Lecture 45 - Organosilicon compounds, organoalkoxysilanes
- Lecture 46 - Organomercapto silanes and silicones
- Lecture 47 - Silicone rubber
- Lecture 48 - Inorganic solids
- Lecture 49 - Zeolites
- Lecture 50 - Inorganic Fibres
- Lecture 51 - Glass fibre production and construction materials
- Lecture 52 - Ceramics and its manufacturing processes
- Lecture 53 - Specialty ceramic products
- Lecture 54 - Ferrites and porcelain enamel
- Lecture 55 - Layers of enamelling
- Lecture 56 - Carbon modifications
- Lecture 57 - Activated carbon
- Lecture 58 - Metallic hard materials
- Lecture 59 - Fillers and inorganic pigments
- Lecture 60 - Oxide pigments, luminescent pigments, corrosion protection pigments, magnetic pigments

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Reactive Intermediates Carbene and Nitrene

Subject Co-ordinator - Prof. Rajarshi Samanta

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction  
Lecture 2 - Structure and Geometry of Carbenes  
Lecture 3 - Structure and Geometry of Carbenes (Continued...)  
Lecture 4 - Generation of Carbene  
Lecture 5 - Generation of Carbene (Continued...)  
Lecture 6 - Generation of Carbene (Continued...)  
Lecture 7 - Reaction of Carbene  
Lecture 8 - Reaction of Carbene (Continued...)  
Lecture 9 - Reaction of Carbene (Continued...)  
Lecture 10 - Reaction of Carbene (Continued...)  
Lecture 11 - Reaction of Carbene (Continued...)  
Lecture 12 - Reaction of Carbene (Continued...)  
Lecture 13 - Reaction of Carbene (Continued...)  
Lecture 14 - Reaction of Carbene (Continued...)  
Lecture 15 - Reaction of Carbene (Continued...)  
Lecture 16 - Nitrene  
Lecture 17 - Nitrene (Continued...)  
Lecture 18 - Reaction of Nitrene  
Lecture 19 - Reaction of Nitrene (Continued...)  
Lecture 20 - Reaction of Nitrene (Continued...)

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Organic Chemistry in Biology and Drug Development

Subject Co-ordinator - Prof. A. Basak

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - A brief introduction to Molecules of Life  
Lecture 2 - Biological Macromolecules and Small molecules  
Lecture 3 - Amino Acids  
Lecture 4 - Amino acids  
Lecture 5 - Method of determination of Amino acid sequence  
Lecture 6 - Selective peptide bond cleavage  
Lecture 7 - Peptide synthesis  
Lecture 8 - Peptide synthesis (Continued...) Protection, coupling and deprotection method  
Lecture 9 - Recent development of coupling agents; Merrifield's method of solid phase peptide synthesis  
Lecture 10 - Hierarchical structure of proteins  
Lecture 11 - Ramachandran plot and protein purification techniques  
Lecture 12 - Protein purification techniques (Continued...)  
Lecture 13 - Introduction to Enzymes and its kinetics  
Lecture 14 - Enzyme catalysed reactions and introduction to catalytic activity of proteases  
Lecture 15 - Enzyme Kinetics (Continued...)  
Lecture 16 - Concept of Enzyme Inhibition  
Lecture 17 - Concept of Enzyme Inhibition (Continued...)  
Lecture 18 - Problems on Enzyme Kinetics and Enzyme Inhibition  
Lecture 19 - Synthetic Biology  
Lecture 20 - Synthetic Biology (Continued...)  
Lecture 21 - Synthetic Biology (Continued...)  
Lecture 22 - Nucleic Acid  
Lecture 23 - Nucleic Acid (Continued...)  
Lecture 24 - DNA sequencing method  
Lecture 25 - DNA sequencing method (Continued...)  
Lecture 26 - DNA sequencing method (Continued...)  
Lecture 27 - Synthesis of oligonucleotide  
Lecture 28 - Central dogma  
Lecture 29 - Central dogma

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

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- Lecture 30 - Central dogma
- Lecture 31 - Central dogma
- Lecture 32 - Central dogma
- Lecture 33 - Molecular Biology
- Lecture 34 - Molecular Biology (Continued...)
- Lecture 35 - Chemistry of cofactors/coenzymes
- Lecture 36 - Chemistry of cofactors/coenzymes (Continued...)
- Lecture 37 - Chemistry of cofactors/coenzymes (Continued...)
- Lecture 38 - Chemistry of cofactors/coenzymes (Continued...)
- Lecture 39 - Chemistry of cofactors/coenzymes (Continued...)
- Lecture 40 - Chemistry of cofactors/coenzymes (Continued...)
- Lecture 41 - Introduction to Drug Discovery Process
- Lecture 42 - Fundamental Principles of Drug Development Process
- Lecture 43 - Combinatorial chemistry
- Lecture 44 - Neurotransmitters
- Lecture 45 - Catechol amine based and GABA neurotransmitters
- Lecture 46 - Hypertension
- Lecture 47 - Inhibitor design of angiotensin converting enzyme
- Lecture 48 - Antimicrobial drugs
- Lecture 49 - Chemistry of penicillins
- Lecture 50 - Resistance to beta-lactam antibiotics
- Lecture 51 - Mechanistic studies of beta-lactamase
- Lecture 52 - Non beta-lactam antibiotics
- Lecture 53 - Mechanistic enzymology of Isopenicillin N synthase
- Lecture 54 - Polyketide Biosynthesis
- Lecture 55 - Biosynthesis of macrolide polyketides and introduction to virus
- Lecture 56 - Anti-viral drugs
- Lecture 57 - Cancer and Chemotherapy
- Lecture 58 - Anti-cancer drugs (Continued...)
- Lecture 59 - Aromatase inhibition and Anti-ulcer drugs
- Lecture 60 - Cholesterol lowering agents
- Lecture 61 - Cholesterol Biosynthesis
- Lecture 62 - Pharmacokinetics and pharmacodynamics
- Lecture 63 - QSAR principles

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Introduction to Polymer Science

Subject Co-ordinator - Dr. D. Dhara

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Importance of Polymer Science and Brief Historical background  
Lecture 2 - Definitions/Terminologies, Classifications  
Lecture 3 - Classifications, Nomenclature  
Lecture 4 - Classification by Polymerization Mechanism, Nomenclature  
Lecture 5 - Molecular Weight, Big Picture of Polymer Science, Common Polymers  
Lecture 6 - Examples of Step Polymers, Linear Step Polymerization  
Lecture 7 - Linear Step Polymerization  
Lecture 8 - Linear Step Polymerization  
Lecture 9 - Linear Step Polymerization  
Lecture 10 - Types of Chain polymerization, Mechanism and Kinetics of Radical Chain Polymerization  
Lecture 11 - Kinetics of Radical Chain Polymerization (Continued...), Various Types of Initiators  
Lecture 12 - Thermal Initiation (Continued...), Molecular Weight and Kinetic Chain Length, Other Types of Rad  
Lecture 13 - Transfer Reactions, Effect of Temperature on Rate and MW, MW Distribution, ceiling Temperature  
Lecture 14 - Energetics and Thermodynamics of Chain Polymerization, MW Distribution, Common Polymers  
Lecture 15 - Thermodynamics of Chain Polymerization, MW Distribution, Common Polymers  
Lecture 16 - Process Conditions, Emulsion Polymerization  
Lecture 17 - Emulsion Polymerization (Continued...), Common Polymers by Radical Chain Polymerization, RDRP  
Lecture 18 - Reversible - Deactivation Radical Polymerizations (RDRP)  
Lecture 19 - RAFT Polymerization (Continued...), Ionic Polymerization  
Lecture 20 - Polymer Stereochemistry and Zeigler - Natta Coordination Polymerization  
Lecture 21 - Ring Opening Polymerization, Copolymers  
Lecture 22 - Copolymerization (Continued...)  
Lecture 23 - Polymers in Solution  
Lecture 24 - Polymers in Solution  
Lecture 25 - Polymers in Solution  
Lecture 26 - Polymers Chain Dimensions  
Lecture 27 - Frictional Properties of Polymer Molecules in Dilute Solution, Determination of Polymer MW (Over  
Lecture 28 - Membrane Osmometry, End Group Analysis, Dilute Solution Viscometry  
Lecture 29 - Dilute Solution Viscometry, Light Scattering Techniques for MW

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

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- Lecture 30 - Gel Permeation Chromatography
- Lecture 31 - Light Scattering Techniques for MW and Size Measurements (Continued...)
- Lecture 32 - Mass Spectroscopy of Polymers
- Lecture 33 - Polymer Processing
- Lecture 34 - Mechanical Properties, Amorphous State
- Lecture 35 - Thermal Properties
- Lecture 36 - Thermal Properties
- Lecture 37 - Thermal Properties
- Lecture 38 - Thermomechanical Properties, Viscoelasticity
- Lecture 39 - Thermomechanical Properties, Viscoelasticity (Continued...)
- Lecture 40 - Optical, Electrical, Barrier Properties; Chemical Resistance and Weathering of Polymers
- Lecture 41 - Polymer Additives
- Lecture 42 - Polymer Blends, Concluding Remarks

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Structure, Stereochemistry and Reactivity of Organic Co

Subject Co-ordinator - Prof. A. Basak

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction to structure and stereochemistry of organic molecules: salient features of symmetry  
Lecture 2 - Introduction to point group notation, classification, symmetry number and order  
Lecture 3 - Examples of various point group notations, chiral and achiral point groups, examples of various p  
Lecture 4 - Solving problems on point groups ( $C_n$ ,  $C_{nv}$ ,  $C_{nh}$ ,  $D_{nd}$ )  
Lecture 5 - Conformational Analysis of Perhydrophenanthrene  
Lecture 6 - Concept Clearing Session on Achiral Point Groups  
Lecture 7 - Axial, Planar and Helical Chirality, assignment of absolute configuration to such molecules  
Lecture 8 - Concept of pseudoasymmetry; Reflection variance/invariance problem; methods of nomenclature syste  
Lecture 9 - Conformational analysis of bicyclic systems: the Decalins  
Lecture 10 - Conformational analysis of Perhydrophenanthrene  
Lecture 11 - Conformational analysis of Perhydroanthracene  
Lecture 12 - Revisiting conformational analysis of Perhydrophenanthrene  
Lecture 13 - Revisiting conformational analysis of Perhydroanthracene  
Lecture 14 - Introduction to Linear Polarized light and interaction with chiral materials; Circular Birefring  
Lecture 15 - ORD, CD and Cotton Effect (CE); Empirical rule to determine the sign of CE, 2-axial haloketone r  
Lecture 16 - Octant rule: application to substituted cyclohexanone and decalone system  
Lecture 17 - Application of Octant rule to tricyclic system; drawing of octant projection  
Lecture 18 - Application of Octant rule to steroidal ketones; drawing of octant projection  
Lecture 19 - Stereoelectronic effects on conformation and reactivity  
Lecture 20 - Examples of anomeric effect and Stereoelectronic effect  
Lecture 21 - Baldwin rules  
Lecture 22 - Cyclization in enolic systems  
Lecture 23 - Problem solving on Baldwin rules  
Lecture 24 - Reactive Functionalities: Chemistry of Alkynes  
Lecture 25 - Reactive Functionalities: Chemistry of Alkynes (Continued...), arynes and enediynes  
Lecture 26 - Reactive Functionalities: Eneidyne (Continued...), allenes and Ketenes  
Lecture 27 - Beta - Lactam Synthesis  
Lecture 28 - Chemistry of radicals  
Lecture 29 - Reactivity of radicals: Frontier orbital approach.

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- Lecture 30 - Radical mediated C-C bond formation
- Lecture 31 - Radical mediated C-C bond formation (Continued...).
- Lecture 32 - Radical mediated decarboxylation and deoxygenation
- Lecture 33 - Dynamic Stereochemistry: Conformationally rigid and mobile systems
- Lecture 34 - Dynamic Stereochemistry: Conformational analysis of elimination and addition
- Lecture 35 - Dynamic Stereochemistry: Stereoselectivity in carbonyl reduction
- Lecture 36 - Dynamic Stereochemistry: Reactivity of unsaturated carbonyl and enolate systems
- Lecture 37 - Dynamic Stereochemistry: Enolate as nucleophile
- Lecture 38 - Dynamic Stereochemistry: stereochemical issues in cyclohexenone reduction and alpha-electrophilic
- Lecture 39 - Dynamic Stereochemistry: Asymmetric aldol reactions
- Lecture 40 - Dynamic Stereochemistry: Asymmetric aldol reaction (Continued...)

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Approximate Methods in Quantum Chemistry

Subject Co-ordinator - Prof. Sabyashachi Mishra

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Review of Quantum Chemistry  
Lecture 2 - Postulates of Quantum Mechanics - I  
Lecture 3 - Postulates of Quantum Mechanics - II  
Lecture 4 - Exactly Solvable Models - I  
Lecture 5 - Exactly Solvable Models - II  
Lecture 6 - Exactly Solvable Models - II (Continued...)  
Lecture 7 - Variational Principle - I  
Lecture 8 - Variational Principle - II  
Lecture 9 - Variational Method: Applications - I  
Lecture 10 - Linear Variational Method  
Lecture 11 - Applications of Linear Variational Method  
Lecture 12 - Variational Method in Chemical Bonding - I  
Lecture 13 - Variational Method in Chemical Bonding - II  
Lecture 14 - Variational Method in Chemical Bonding - III  
Lecture 15 - Molecular Orbital Treatment of Polyatomics  
Lecture 16 - Molecular Orbital Treatment of Polyatomics  
Lecture 17 - Perturbation Theory  
Lecture 18 - Examples of Perturbation Theory - I  
Lecture 19 - Examples of Perturbation Theory - II  
Lecture 20 - Molecular Response to Electric Field - I  
Lecture 21 - Molecular Response to Electric Field - II  
Lecture 22 - Degenerate Perturbation Theory  
Lecture 23 - Excited States of He Atom - I  
Lecture 24 - Excited States of He Atom - II  
Lecture 25 - Slater Determinants - I  
Lecture 26 - Slater Determinants - II  
Lecture 27 - Energy Expectation Value with Slater Determinants - I  
Lecture 28 - Energy Expectation Value with Slater Determinants - II  
Lecture 29 - Self-Consistent Field Method

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- Lecture 30 - Canonical HF Equations
- Lecture 31 - Hartree-Fock Energy
- Lecture 32 - Hartree-Fock-Roothan Equations
- Lecture 33 - The Density Matrix
- Lecture 34 - Evaluation of Molecular Properties
- Lecture 35 - Basis Sets - I
- Lecture 36 - Basis Sets - II
- Lecture 37 - Electron Correlation and Post HF Methods
- Lecture 38 - Time-Dependent Perturbation Theory - I
- Lecture 39 - Time-Dependent Perturbation Theory - II
- Lecture 40 - Slowly Switched Constant Perturbation
- Lecture 41 - Oscillating Perturbation
- Lecture 42 - Einstein's Coefficients

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Biological Inorganic Chemistry

Subject Co-ordinator - Prof. Debashis Ray

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Metal Ions In Biological Systems  
Lecture 2 - Metallobiosite structures  
Lecture 3 - Biomolecular structure and molecular biology component  
Lecture 4 - Structures of nucleic acids  
Lecture 5 - Coordination Chemistry in action  
Lecture 6 - Coordination of peptide building blocks  
Lecture 7 - Occurrence and availability  
Lecture 8 - Potential ligands of different types  
Lecture 9 - Metal ion insertion  
Lecture 10 - Organic cofactors and siderophores  
Lecture 11 - Introduction  
Lecture 12 - CD and Raman spectroscopy  
Lecture 13 - EPR  
Lecture 14 - NMR and X-ray  
Lecture 15 - Electrochemical methods  
Lecture 16 - Metal ion assimilation  
Lecture 17 - Transport of metal ions in bacteria and plants  
Lecture 18 - Transport of metal ions in fungi and mammals  
Lecture 19 - Homeostasis in bacteria and plants  
Lecture 20 - Homeostasis in fungi and mammals  
Lecture 21 - Transport across membranes  
Lecture 22 - Ion channels and ion pumps  
Lecture 23 - (K<sup>+</sup>) channels  
Lecture 24 - (Na<sup>+</sup>) channels  
Lecture 25 - (Na<sup>+</sup>)-(K<sup>+</sup>) ATPase  
Lecture 26 - (Mg<sup>2+</sup>) dependent enzymes and kinases  
Lecture 27 - Phosphatases and enolases  
Lecture 28 - Photoreception and enzymes  
Lecture 29 - (Ca<sup>2+</sup>) transporting, binding and sensor proteins

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- Lecture 30 - Cell signaling by (Ca<sup>2+</sup>) binding and sensing
- Lecture 31 - Functions of iron ions and iron ion proteins
- Lecture 32 - Heme proteins for (O<sub>2</sub>) transport and storage
- Lecture 33 - Activators of (O<sub>2</sub>) and electron transport proteins
- Lecture 34 - Iron-sulfur proteins
- Lecture 35 - Mononuclear and dinuclear non-heme enzymes
- Lecture 36 - Oxygen transport and SOD activity
- Lecture 37 - Type 1 blue copper proteins
- Lecture 38 - Type 2 non-blue copper proteins
- Lecture 39 - Type 3 dinuclear copper proteins
- Lecture 40 - Multicopper and mixed-copper enzymes
- Lecture 41 - Coordination chemistry and function of zinc ions
- Lecture 42 - Carbonic anhydrase and lyases
- Lecture 43 - Carboxypeptidase and metalloproteinases
- Lecture 44 - Alcohol dehydrogenase and Beta-lactamase
- Lecture 45 - Redox catalysis by manganese ions
- Lecture 46 - Redox catalysis by manganese ions
- Lecture 47 - Catalysis by manganese and cobalt ions
- Lecture 48 - Cobalt ion dependent proteins and enzymes
- Lecture 49 - Nickel proteins and enzymes
- Lecture 50 - More nickel ion bearing enzymes
- Lecture 51 - Carbon, hydrogen and oxygen
- Lecture 52 - Nitrogen and Silicon
- Lecture 53 - Phosphorus
- Lecture 54 - Sulfur and Selenium
- Lecture 55 - Chlorine and Iodine
- Lecture 56 - Brain and blood-brain barrier (BBB)
- Lecture 57 - Zinc and copper ions
- Lecture 58 - Iron ions
- Lecture 59 - Metal ion based drugs and metallotherapeutics
- Lecture 60 - Chemotherapy, radiotherapy and contrast agents

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Principles and Applications of Enolate Alkylation

Subject Co-ordinator - Prof. Samik Nanda

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Enolate generation, structure of enolates and related topic - I
- Lecture 2 - Enolate generation, structure of enolates and related topic - II
- Lecture 3 - Enolate generation, structure of enolates and related topic - III
- Lecture 4 - Different mode of asymmetric induction in enolate alkylation
- Lecture 5 - Revisit again, Different mode of asymmetric induction in enolate alkylation
- Lecture 6 - Substrate directed stereocontrol in acyclic and cyclic system
- Lecture 7 - Substrate directed enolate alkylation in bicyclic system
- Lecture 8 - Seebach's SRS principle and related systems - I
- Lecture 9 - Seebach's SRS principle and related systems - II
- Lecture 10 - Seebach's SRS principle and related systems - III
- Lecture 11 - Evans oxazolidinone and related systems - I
- Lecture 12 - Evans oxazolidinone and related systems - II
- Lecture 13 - Evans oxazolidinone and related systems - III
- Lecture 14 - Evans oxazolidinone and related systems - IV
- Lecture 15 - Evans oxazolidinone and related systems - V
- Lecture 16 - Helmchen's auxiliary, Oppolzer's sultam based auxiliary
- Lecture 17 - Camphor based N-acyloxazolidinones as chiral auxiliary
- Lecture 18 - Myer's ephedrine, Chiral Weinreb amide equivalents and related systems
- Lecture 19 - Myer's ephedrine and related systems
- Lecture 20 - Chiral Weinreb amide equivalents and related systems
- Lecture 21 - Meyer's oxazoline based alkylation - I
- Lecture 22 - Meyer's oxazoline based alkylation - II
- Lecture 23 - Meyer's bicyclic lactam based enolate alkylation
- Lecture 24 - Meyer's bicyclic lactam based alkylation
- Lecture 25 - Meyer's bicyclic lactams, Gleason's bicyclic thioglycolate lactam based systems
- Lecture 26 - Few problem solving from Meyer's oxazoline/bicyclic lactam based alkylation
- Lecture 27 - Schollkopf's bis-lactim ether and related systems; Auxiliary induced chiral relay
- Lecture 28 - Chiral relay systems in amino acid derived enolate alkylation
- Lecture 29 - Williams oxazinone, Yamada's chiral glycine enolate and related system

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- Lecture 30 - Tricycloiminolactone as chiral glycine equivalents
- Lecture 31 - Najera's auxiliary, Davies diketopiperazine and related system
- Lecture 32 - Ender's RAMP/SAMP, Coltart's cyclic carbamate hydrazone, Ellman's sulfinamide and related
- Lecture 33 - Ender's RAMP/SAMP based systems
- Lecture 34 - Ender's RAMP/SAMP based systems
- Lecture 35 - Ender's RAMP/SAMP, Coltart's cyclic carbamate hydrazone, Ellman's sulfinamide
- Lecture 36 - Coltart's cyclic carbamate hydrazone and its exploration
- Lecture 37 - Memory of chirality in enolate alkylation
- Lecture 38 - Organocatalytic methods for enolate alkylation (SOMO activation)
- Lecture 39 - Enantioselective alkylation with chiral PTC
- Lecture 40 - Overall analysis of the entire discussion

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Overview and Integration of Cellular Metabolism

Subject Co-ordinator - Dr. Arindam Ghosh, Dr. Aritri Bir

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Bioenergetics: Understanding the significance in Biological Systems
- Lecture 2 - Regulation of Enzyme Activity
- Lecture 3 - Digestion and Absorption of Carbohydrates
- Lecture 4 - Glycolysis, alcohol and lactic acid fermentation
- Lecture 5 - Biochemistry of TCA Cycle (I)
- Lecture 6 - TCA Cycle (II) - Regulation and special characteristics
- Lecture 7 - Neoglucogenesis
- Lecture 8 - Regulation of Glycolysis and Neoglucogenesis - I
- Lecture 9 - Regulation of Glycolysis and Neoglucogenesis - II Cori Cycle, Rapoport Leubering
- Lecture 10 - Hexose Monophosphate Shunt : Steps and Phases
- Lecture 11 - Hexose Monophosphate Shunt : Regulation and Significance
- Lecture 12 - Glycogen Metabolism - I
- Lecture 13 - Glycogen Metabolism - II
- Lecture 14 - Glycogen Metabolism - III
- Lecture 15 - Glycogen Metabolism - IV
- Lecture 16 - Galactose Metabolism and Associated Disorders
- Lecture 17 - Fructose Metabolism and Associated Disorders
- Lecture 18 - Regulation of Blood Glucose
- Lecture 19 - Diabetes Mellitus and Metabolic Alterations
- Lecture 20 - Digestion and absorption of Lipid
- Lecture 21 - Lipoprotein Metabolism - I
- Lecture 22 - Lipoprotein Metabolism - II
- Lecture 23 - Lipoprotein metabolism - III
- Lecture 24 - Fatty acid catabolism (Oxidation of Fatty acids) - I
- Lecture 25 - Fatty acid catabolism (Oxidation of Fatty acids) - II
- Lecture 26 - Fatty acid catabolism (Oxidation of Fatty acids) - III
- Lecture 27 - Metabolism of Ketone Bodies
- Lecture 28 - Biosynthesis of Fatty acid and its regulation
- Lecture 29 - Biosynthesis of triacylglycerol, phosphoglycerides and sphingolipids

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

- Lecture 30 - Cholesterol Metabolism
- Lecture 31 - Digestion and absorption of Protein
- Lecture 32 - Transformation of Amino acids
- Lecture 33 - Metabolism of Ammonia and ammonia toxicity
- Lecture 34 - Urea cycle - Steps, Significance and Energetics
- Lecture 35 - Urea Cycle - Regulation and Enzyme Deficiency Disorders
- Lecture 36 - Metabolism of Phenylalanine and Associated Disorders
- Lecture 37 - Tyrosine Metabolism - I
- Lecture 38 - Tyrosine Metabolism - II (Catecholamines)
- Lecture 39 - Tyrosine Metabolism - III
- Lecture 40 - Tryptophan Metabolism
- Lecture 41 - Metabolism of Sulphur containing Amino acids (Methionine and Cysteine)
- Lecture 42 - Metabolism of Glycine and its disorders
- Lecture 43 - Metabolism of Serine, Threonine and Alanine
- Lecture 44 - Branched chain amino acid metabolism and their disorders
- Lecture 45 - Metabolism of Histidine, Proline, Arginine and Lysine
- Lecture 46 - Heme Metabolism - I (Heme Synthesis and Regulation)
- Lecture 47 - Heme Metabolism - II (Disorders of Heme Synthesis - Porphyrrias)
- Lecture 48 - Heme Metabolism - III (Heme Degradation, Transport and Bilirubin Metabolism)
- Lecture 49 - Disorders of Bilirubin Metabolism
- Lecture 50 - Nucleotide Metabolism - I (Purine Metabolism)
- Lecture 51 - Nucleotide Metabolism - II (Disorders of Purine Metabolism)
- Lecture 52 - Nucleotide Metabolism - III (Pyrimidine Metabolism and Disorders)
- Lecture 53 - Inborn errors of Metabolism
- Lecture 54 - Integration of Metabolism - I (Cellular and Organ level integration)
- Lecture 55 - Integration of Metabolism - II (Starve feed cycle)
- Lecture 56 - Integration of Metabolism - III (Metabolic Control Analysis)
- Lecture 57 - Obesity, Metabolic Syndrome and Role of Adipokines
- Lecture 58 - Fatty Liver and alcohol metabolism
- Lecture 59 - Energy metabolism and Nutritional disorders, Protein Energy Malnutrition and Dietary
- Lecture 60 - Metabolism in Cancer Cells

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Elementary Thermodynamics for All

Subject Co-ordinator - Prof. Srabani Taraphder

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Introduction  
Lecture 2 - System, Equilibrium States  
Lecture 3 - Mathematical foundation - Exact differentials  
Lecture 4 - Mathematical foundation - Inexact differentials  
Lecture 5 - First law - Introduction to Internal energy  
Lecture 6 - First law - Heat and work  
Lecture 7 - First law - Pressure-volume work  
Lecture 8 - First law - Internal energy revisited  
Lecture 9 - First Law - Enthalpy  
Lecture 10 - First law - Estimation of change in internal energy and enthalpy  
Lecture 11 - Second law - Introduction  
Lecture 12 - Second law - Carnot engine and entropy  
Lecture 13 - Entropy and Third law  
Lecture 14 - Entropy and Spontaneity in isolated systems  
Lecture 15 - Spontaneity and equilibrium - Thermodynamic potentials  
Lecture 16 - Spontaneity and equilibrium - Non-isolated systems  
Lecture 17 - Thermodynamic potentials and Maxwell's relations  
Lecture 18 - Application of Maxwell's relations  
Lecture 19 - Thermodynamic response functions  
Lecture 20 - Using Maxwell's relations to solve numerical problems  
Lecture 21 - Fundamental Equation of Chemical Thermodynamics  
Lecture 22 - Open systems and chemical potential  
Lecture 23 - Chemical potential in one and many component ideal gas  
Lecture 24 - Gibbs-Duhem relation and thermodynamics of ideal gas mixture  
Lecture 25 - Numerical applications of Gibbs-Duhem relation  
Lecture 26 - Phase equilibrium - Part 1  
Lecture 27 - Phase equilibrium - Part 2  
Lecture 28 - Phase equilibrium - Part 3  
Lecture 29 - Phase equilibrium - Part 4

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- Lecture 30 - Numerical problems in phase equilibrium
- Lecture 31 - Simple non-reactive mixtures - Part 1
- Lecture 32 - Simple non-reactive mixtures - Part 2
- Lecture 33 - Numerical problems in simple mixtures
- Lecture 34 - Numerical problems on phase equilibrium in simple mixtures
- Lecture 35 - Chemical potential of real systems - Activity and concentration
- Lecture 36 - Numerical problems on chemical potential in real systems
- Lecture 37 - Chemical Equilibrium - Part I
- Lecture 38 - Chemical Equilibrium - Part II
- Lecture 39 - Chemical Equilibrium - Part III
- Lecture 40 - Chemical Equilibrium - Part IV
- Lecture 41 - Numerical problems on chemical equilibrium
- Lecture 42 - Numerical problems on chemical equilibrium (Continued...)
- Lecture 43 - Electrochemical equilibrium - Part I
- Lecture 44 - Electrochemical equilibrium - Part II
- Lecture 45 - Electrochemical equilibrium - Part III
- Lecture 46 - Electrochemical equilibrium - Part IV
- Lecture 47 - Electrochemical equilibrium - Part V
- Lecture 48 - Electrochemical equilibrium - Part VI
- Lecture 49 - Numerical problems on electrochemistry
- Lecture 50 - Numerical problems on electrochemistry (Continued...)
- Lecture 51 - Numerical problems on electrochemistry (Continued...)
- Lecture 52 - Numerical problems on electrochemistry (Continued...)
- Lecture 53 - Numerical problems on electrochemistry (Continued...)
- Lecture 54 - Thermodynamic stability
- Lecture 55 - Thermodynamics in action - Part I
- Lecture 56 - Thermodynamics in action - Part II
- Lecture 57 - Thermodynamics in action - Part III
- Lecture 58 - Thermodynamics in action - Part IV
- Lecture 59 - Demonstration
- Lecture 60 - Concluding Lectuer

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Molecular Rearrangements and Reactive Intermediates in

Subject Co-ordinator - Prof. Santanu Panda

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - Carbocation  
Lecture 2 - Carbocation (Continued...)  
Lecture 3 - Carbocation (Continued...)  
Lecture 4 - Carbocation (Continued...)  
Lecture 5 - Carbocation (Continued...)  
Lecture 6 - Carbanion  
Lecture 7 - Carbanion (Continued...)  
Lecture 8 - Carbanion (Continued...)  
Lecture 9 - Carbanion (Continued...)  
Lecture 10 - Carbanion (Continued...)  
Lecture 11 - Carbene  
Lecture 12 - Carbene (Continued...)  
Lecture 13 - Carbene (Continued...)  
Lecture 14 - Carbene (Continued...)  
Lecture 15 - Nitrene  
Lecture 16 - Nitrene(Continued...)  
Lecture 17 - Radical  
Lecture 18 - Radical (Continued...)  
Lecture 19 - Free Radical  
Lecture 20 - Radical  
Lecture 21 - Radical  
Lecture 22 - Free Radical (Continued...)  
Lecture 23 - Radical  
Lecture 24 - Free Radical Reactions  
Lecture 25 - Radical (Continued...)  
Lecture 26 - Radical (Continued...)  
Lecture 27 - Radical (Continued...)  
Lecture 28 - Benzyne  
Lecture 29 - Benzyne (Continued...)

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Lecture 30 - Benzyne (Continued...)  
Lecture 31 - Benzyne question answer discussion  
Lecture 32 - Organolithium  
Lecture 33 - Organolithium (Continued...)  
Lecture 34 - Organolithium (Continued...)  
Lecture 35 - Organolithium (Continued...)  
Lecture 36 - Organolithium (Continued...)  
Lecture 37 - Grignard  
Lecture 38 - Grignard (Continued...)  
Lecture 39 - Organocopper  
Lecture 40 - Organozinc  
Lecture 41 - Organoboron Chemistry  
Lecture 42 - Organoboron Chemistry (Continued...)  
Lecture 43 - Organoboron Chemistry (Continued...)  
Lecture 44 - Organoboron Chemistry (Continued...)  
Lecture 45 - Organoboron  
Lecture 46 - Organoboron Chemistry  
Lecture 47 - Organosilicon Chemistry  
Lecture 48 - Organosilicon Chemistry (Continued...)  
Lecture 49 - Organosilicon Chemistry (Continued...)  
Lecture 50 - Organosulfur Chemistry  
Lecture 51 - Organosulfur  
Lecture 52 - Organosulfur (Continued...)  
Lecture 53 - Organosulfur (Continued...)  
Lecture 54 - Organophosphorus Chemistry  
Lecture 55 - Organophosphorus Chemistry (Continued...)  
Lecture 56 - Tutorial 1  
Lecture 57 - Tutorial 2  
Lecture 58 - Tutorial 3  
Lecture 59 - Tutorial 4  
Lecture 60 - Tutorial 5  
Lecture 61 - Tutorial 6

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

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 Lecture Topic List - Created by LinuXpert Systems, Chennai

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 Lecture Topic List - Created by LinuXpert Systems, Chennai

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

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Module 30  
Module 31  
Module 32  
Module 33  
Module 34  
Module 35  
Module 36

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

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 ^ examples of 3, 4 and 5 membered ring systems (2e and 4e systems)  
Lecture 5 - Electrocyclic reactions ^ 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 ^ ketene cycloadditions  
Lecture 9 - Cycloaddition reactions ^ 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 ^ Sigmatropic rearrangements ^ Introduction and [1,3] migrations  
Lecture 17 - Pericyclic reactions ^ Sigmatropic rearrangements (Continued...) [1,5] H and C migrations and Cope rearrangement  
Lecture 18 - Pericyclic reactions ^ Sigmatropic rearrangements (Continued...) oxy Cope and Claisen Rearrangement  
Lecture 19 - Pericyclic reactions ^ Sigmatropic rearrangements (Continued...)  
Lecture 20 - Pericyclic reactions ^ Sigmatropic rearrangements (Continued...) [2,3] sigmatropic shifts and H-shifts  
Lecture 21 - Pericyclic reactions ^ Sigmatropic rearrangements (Continued...) Wittig rearrangement and higher order  
Lecture 22 - Pericyclic reactions ^ Chelotropic reactions - introduction, SO2 extrusion reactions  
Lecture 23 - Pericyclic reactions ^ 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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## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

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- Lecture 30 - Photochemistry of carbonyl compounds, Norrish type1 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



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

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

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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

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

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 - Phase equilibrium - Part 4

Lecture 20 - Phase equilibrium - Part 5

Lecture 21 - Phase equilibrium - Part 6

Lecture 22 - Phase equilibrium - Part 7

Lecture 23 - Mixtures - Part 1

Lecture 24 - Mixtures - Part 2

Lecture 25 - Mixtures - Part 3

Lecture 26 - Mixtures - Part 4

Lecture 27 - Mixtures - Part 5

Lecture 28 - Chemical Equilibrium - Part 1

Lecture 29 - Chemical Equilibrium - Part 2

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Lecture 30 - Chemical Equilibrium - Part 3  
Lecture 31 - Chemical Equilibrium - Part 4  
Lecture 32 - Chemical Equilibrium - Part 5  
Lecture 33 - Chemical equilibrium - Part 2B  
Lecture 34 - Chemical equilibrium - Part 2C  
Lecture 35 - Electrochemistry - Part 1  
Lecture 36 - Electrochemistry - Part 2  
Lecture 37 - Electrochemistry - Part 3  
Lecture 38 - Surfaces and interfaces  
Lecture 39 - Chemical Kinetics: Rate laws - Part 1  
Lecture 40 - Chemical Kinetics: Rate laws - Part 2  
Lecture 41 - Chemical Kinetics: Rate laws - Part 3  
Lecture 42 - Chemical Kinetics: Rate laws - Part 4  
Lecture 43 - Chemical Kinetics: Mechanisms - Part 1  
Lecture 44 - Chemical Kinetics: Mechanisms - Part 2  
Lecture 45 - Chemical Kinetics: Mechanisms - Part 3  
Lecture 46 - Chemical Kinetics: Mechanisms - Part 4  
Lecture 47 - Chemical Kinetics: Mechanisms - Part 5  
Lecture 48 - Chemical Kinetics: Mechanisms - Part 6  
Lecture 49 - Reaction dynamics - Part 1  
Lecture 50 - Reaction dynamics - Part 2  
Lecture 51 - Reaction dynamics - Part 3  
Lecture 52 - Reaction dynamics - Part 4  
Lecture 53 - Reaction dynamics - Part 5  
Lecture 54 - Reaction dynamics - Part 6  
Lecture 55 - Reaction dynamics - Part 7

## 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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- 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 Center
- 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



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

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

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- 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 - H<sub>2</sub> Molecular Orbital Theory - I
- Lecture 56 - H<sub>2</sub> Molecular Orbital Theory - II

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Electrochemical Impedance Spectroscopy

Subject Co-ordinator - Dr. S. Ramanathan

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Electrochemistry, double layer, 3 electrode systems, supporting electrolyte  
Lecture 2 - Rate constant, concept of impedance, Z of electrical elements, differential impedance  
Lecture 3 - Time domain results  
Lecture 4 - Graphical representation of data (Complex plane, Bode)  
Lecture 5 - Introduction to other techniques  
Lecture 6 - Tutorial 01  
Lecture 7 - Type of analyzers, single and multi sine  
Lecture 8 - FFT details, frequency range and resolution, cross correlation  
Lecture 9 - Multi sine, odd harmonic, non-harmonics, crest factor, spectral leakage  
Lecture 10 - Windowing  
Lecture 11 - Tutorial 02  
Lecture 12 - Introduction to KKT  
Lecture 13 - Linearity, causality, stability, impedance vs. admittance, measurement model  
Lecture 14 - Linear KKT illustration  
Lecture 15 - Tutorial 03  
Lecture 16 - Introduction to EEC, Choice of circuits, confidence intervals, AIC  
Lecture 17 - EEC fitting, initial values, distinguishability  
Lecture 18 - Zero/pole representation,  $R_t$  and  $R_p$   
Lecture 19 - Maxwell, Voigt, Ladder circuits, choice of initial values illustrated  
Lecture 20 - Tutorial 04  
Lecture 21 - Simple electron transfer reaction  
Lecture 22 - Two step reaction with an intermediate (1 of 3)  
Lecture 23 - Two step reaction with an intermediate (2 of 3)  
Lecture 24 - Two step reaction with an intermediate (3 of 3)  
Lecture 25 - E-EAR reaction, negative resistance (1 of 2)  
Lecture 26 - E-EAR reaction, negative resistance (2 of 2)  
Lecture 27 - Three step reaction with two adsorbed intermediates  
Lecture 28 - Catalytic mechanism  
Lecture 29 - Examples with Frumkin or Temkin isotherms

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

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Lecture 30 - Challenges in RMA  
Lecture 31 - Patterns Reported in Experiments  
Lecture 32 - Warburg part - 1  
Lecture 33 - Warburg part - 2  
Lecture 34 - Warburg part - 3  
Lecture 35 - Bounded Warburg  
Lecture 36 - CPE  
Lecture 37 - Porous electrodes  
Lecture 38 - Films, PDM  
Lecture 39 - PDM  
Lecture 40 - Applications  
Lecture 41 - NLEIS. Introduction and mathematical background  
Lecture 42 - Electron Transfer reaction  
Lecture 43 - Two step reaction  
Lecture 44 - Two step reaction (Continued...)  
Lecture 45 -  $R_t$  and  $R_p$  estimation  
Lecture 46 - Galvanostatic simulations  
Lecture 47 - Instabilities  
Lecture 48 - Solution resistance effects  
Lecture 49 - Detection on nonlinearities using KKT  
Lecture 50 - Frumkin and Temkin isotherms  
Lecture 51 - NLEIS Experimental aspects. FFT, PSD, THD  
Lecture 52 - Application - other techniques HA, EFM

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

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

Subject Co-ordinator - Prof. Harinath Chakrapani

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to Medicinal Chemistry - Part I  
Lecture 2 - Introduction to Medicinal Chemistry - Part II  
Lecture 3 - Intermolecular Binding Forces  
Lecture 4 - Protein Structure and Function  
Lecture 5 - Tutorial 1 - Acidity, Basicity and Related concepts  
Lecture 6 - Tutorial 2 - Basic Concepts of Thermodynamics and Kinetics  
Lecture 7 - Enzyme Catalysis - Part I  
Lecture 8 - Enzyme Catalysis - Part II  
Lecture 9 - Tutorial 3 - Binding Forces, Protein Structure and Function  
Lecture 10 - Introduction to Receptors  
Lecture 11 - Receptor Types and Functions  
Lecture 12 - Tutorial 4 - Receptors, Binding Interactions, Ion Channels  
Lecture 13 - Nucleic Acids  
Lecture 14 - RNA and Protein Synthesis  
Lecture 15 - Tutorial 5 - Nucleic acids, and Basics of Molecular Biology  
Lecture 16 - Enzymes as Drug Targets  
Lecture 17 - Enzyme Kinetics and Inhibition  
Lecture 18 - Tutorial 6 - Enzyme Kinetics, Various Modes of Inhibition etc.  
Lecture 19 - Receptors as Drug Targets - Part I  
Lecture 20 - Receptors as Drug Targets - Part II  
Lecture 21 - Tutorial 7 - Receptor-Drug Interactions, Stereochemistry, Chirality, Nomenclature  
Lecture 22 - Receptor-Drug Interactions.  
Lecture 23 - Stereochemistry and Conformation  
Lecture 24 - Tutorial 8 - Determination of Drug-Receptor Interactions, Conformation of Cyclic and Acyclic Str  
Lecture 25 - Nucleic Acids as Drug Targets - Part I  
Lecture 26 - Nucleic Acids as Drug Targets - Part II  
Lecture 27 - Miscellaneous Drug Targets  
Lecture 28 - Tutorial 9 - Nucleic Acids and Related Topics  
Lecture 29 - Mechanisms in Biological Chemistry - Part I

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

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Lecture 30 - Mechanisms in Biological Chemistry - Part II  
Lecture 31 - Mechanisms in Biological Chemistry - Part III  
Lecture 32 - Pharmacokinetics - Part I  
Lecture 33 - Pharmacokinetics - Part II  
Lecture 34 - Drug Metabolism - Part I  
Lecture 35 - Drug Metabolism - Part II  
Lecture 36 - Drug Metabolism - Part III  
Lecture 37 - Drug Metabolism - Part IV  
Lecture 38 - Tutorial 10 - ADME  
Lecture 39 - Drug Administration Routes - Part I  
Lecture 40 - Drug Administration Routes - Part II  
Lecture 41 - Finding a Lead - Part I  
Lecture 42 - Finding a Lead - Part II  
Lecture 43 - Drug Screening  
Lecture 44 - Tutorial 11 - Drug administration routes and finding a lead  
Lecture 45 - Optimizing Drug-Target Interactions - Part I  
Lecture 46 - Optimizing Drug-Target Interactions - Part II  
Lecture 47 - Optimizing Drug-Target Interactions - Part III  
Lecture 48 - Optimizing Drug-Target Interactions - Part IV  
Lecture 49 - Tutorial 12  
Lecture 50 - Optimizing Access to the Target  
Lecture 51 - Prodrugs  
Lecture 52 - Prodrugs and Drug Alliances  
Lecture 53 - Endogenous Compounds, Peptidomimetics and Oligonucleotides as Drugs  
Lecture 54 - Tutorial 13- Optimizing Access-Prodrugs  
Lecture 55 - Combinatorial and parallel synthesis  
Lecture 56 - Computer in Medicinal Chemistry  
Lecture 57 - Antibacterial agents - 1  
Lecture 58 - Antibacterial agents - 2  
Lecture 59 - Tutorial14-Combinatorial and parallel synthesis, computers in med chem and anti-bacterial agents  
Lecture 60 - Anti-viral agents - 1  
Lecture 61 - Anti-viral agents - 2  
Lecture 62 - Anti-cancer agents - 1  
Lecture 63 - Anti-cancer agents - 2  
Lecture 64 - Cholinergics  
Lecture 65 - Anti-ulcer agents  
Lecture 66 - QSAR - 1  
Lecture 67 - QSAR - 2  
Lecture 68 - QSAR - 3

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Lecture 69 - Drug Resistance and Synergy

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

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

Subject Co-ordinator - Prof. Arnab Mukherjee

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to The Thermodynamics  
Lecture 2 - History of Thermodynamic  
Lecture 3 - Thermodynamic Systems and Variables  
Lecture 4 - Zeroth Law of Thermodynamic  
Lecture 5 - Microscopic Definition of Temperature - Part 1  
Lecture 6 - Microscopic Definition of Temperature - Part 2  
Lecture 7 - Different Forms of Energy  
Lecture 8 - Real Gas and Virial Equation  
Lecture 9 - Van der Waals Gas  
Lecture 10 - Work and Heat - Part 1  
Lecture 11 - Work and Heat - Part 2  
Lecture 12 - First Law of Thermodynamics  
Lecture 13 - Microscopic Definition of Heat and Work  
Lecture 14 - Work done at a Constant Temperature  
Lecture 15 - Heat is a path function  
Lecture 16 - Joule-Thomson Effect (For Ideal Gases)  
Lecture 17 - Joule-Thomson Effect (For Van der Waals gas)  
Lecture 18 - Adiabatic Reversible Work  
Lecture 19 - Adiabatic Irreversible Work  
Lecture 20 - Tutorial Problem - 1  
Lecture 21 - Tutorial Problem - 2  
Lecture 22 - Thermochemistry - Part 1  
Lecture 23 - Thermochemistry - Part 2  
Lecture 24 - Second Law of Thermodynamics  
Lecture 25 - Statements of the Second Law of Thermodynamics  
Lecture 26 - Carnot Cycle and Definition of Entropy  
Lecture 27 - Ideal Stirling Engine  
Lecture 28 - Gasoline Engine and Diesel Engine  
Lecture 29 - Carnot's Cycle

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Lecture 30 - Thermodynamic Temperature  
Lecture 31 - Definition of Entropy  
Lecture 32 - Tutorial Problem - 3  
Lecture 33 - Tutorial Problem - 4  
Lecture 34 - Tutorial Problem - 5  
Lecture 35 - Tutorial Problem - 6  
Lecture 36 - Tutorial Problem - 7  
Lecture 37 - Tutorial Problem - 8  
Lecture 38 - Statistical Formulation of the Second Law  
Lecture 39 - Probability  
Lecture 40 - Microstates and Distributions  
Lecture 41 - Permutation and Combination  
Lecture 42 - Two-Level Systems  
Lecture 43 - Most Probable Distribution  
Lecture 44 - Calculation with Multi-Level systems  
Lecture 45 - Calculation with Multi-Level systems with fixed energy - Part 1  
Lecture 46 - Calculation with Multi-Level systems with fixed energy - Part 2  
Lecture 47 - Calculation with Multi-Level systems with fixed energy - Part 3  
Lecture 48 - Bose-Einstein, Fermi-Dirac and Maxwell-Boltzmann distribution  
Lecture 49 - Most Probable Distribution is the Boltzmann Distribution  
Lecture 50 - Demonstration of Boltzmann Distribution  
Lecture 51 - Estimating Entropy for Various Processes  
Lecture 52 - Microscopic equivalent of Heat and Work  
Lecture 53 - Probability and Boltzmann Distribution  
Lecture 54 - Thermodynamic Observables  
Lecture 55 - Tutorial Problem - 9  
Lecture 56 - Tutorial Problem - 10  
Lecture 57 - Tutorial Problem - 11  
Lecture 58 - Tutorial Problem - 12  
Lecture 59 - Thermodynamic free energy  
Lecture 60 - Condition for Spontaneity  
Lecture 61 - Legendre Transformation of Thermodynamic Potentials  
Lecture 62 - Maxwell Relations and Applications  
Lecture 63 - Thermodynamic Relations using Jacobian Method - Part 1  
Lecture 64 - Thermodynamic Relations using Jacobian Method - Part 2  
Lecture 65 - Tutorial Problem - 13  
Lecture 66 - Tutorial Problem - 14  
Lecture 67 - Tutorial Problem - 15  
Lecture 68 - Tutorial Problem - 16

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

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Lecture 69 - Chemical Principle II - Overview and Road Ahead

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

NPTEL Video Course - Chemistry and Biochemistry - Organic Chemistry Lab Certification

Subject Co-ordinator - Prof. Harinath Chakrapani

Co-ordinating Institute - IISER PUNE

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

Lecture 1 - Feedback on Techniques in Organic Chemistry

Lecture 2 - Introduction to Claisen - Condensation

Lecture 3 - Introduction to Claisen - Condensation

Lecture 4 - How to separate different components from a mixture using column chromatography

Lecture 5 - Fluorescence phenomenon

Lecture 6 - Reaction Mechanism and Stereochemistry

Lecture 7 - Chemiluminescence Phenomenon

Lecture 8 - Post Lab Questions

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

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

Subject Co-ordinator - Prof. Harinath Chakrapani

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction Structure of atom and molecules  
Lecture 2 - Introduction to Molecular Orbital Theory - Part 1  
Lecture 3 - Introduction to Molecular Orbital Theory - Part 2  
Lecture 4 - Tutorial 01  
Lecture 5 - Learning Objectives for week 2  
Lecture 6 - Alkanes and Cycloalkanes - Part 1  
Lecture 7 - Alkanes and Cycloalkanes - Part 2  
Lecture 8 - Conformational Analysis of Cyclohexane - Part 1  
Lecture 9 - Conformational Analysis of Cyclohexane - Part 2  
Lecture 10 - Physical Properties of Alkanes  
Lecture 11 - Nomenclature of Alkanes, Cycloalkanes and Bicycloalkanes  
Lecture 12 - Tutorial 02  
Lecture 13 - Learning Objectives for week 3  
Lecture 14 - Chirality and Stereochemistry - Part 1  
Lecture 15 - Chirality and Stereochemistry - Part 2  
Lecture 16 - Chirality and Stereochemistry - Part 3  
Lecture 17 - Tutorial 03  
Lecture 18 - Learning Objectives for week 4  
Lecture 19 - Acids and Bases - Part 1  
Lecture 20 - Acids and Bases - Part 2  
Lecture 21 - Acids and Bases - Part 3  
Lecture 22 - Tutorial 04  
Lecture 23 - Learning Objectives for week 5  
Lecture 24 - Arrow Pushing mechanism in Organic Chemistry  
Lecture 25 - Alkenes\_Structure, Properties and Nomenclature  
Lecture 26 - Reactions of Alkenes - Part 1  
Lecture 27 - Reactions of Alkenes - Part 2  
Lecture 28 - Reactions of Alkenes - Part 3  
Lecture 29 - Tutorial 05 - Part 1

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

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Lecture 30 - Tutorial 05 - Part 2  
Lecture 31 - Learning Objectives for week 6  
Lecture 32 - Reactions of Alkenes - Part 4  
Lecture 33 - Reactions of Alkenes - Part 5  
Lecture 34 - Alkynes  
Lecture 35 - Reactions of Alkynes - Part 1  
Lecture 36 - Reactions of Alkynes - Part 2  
Lecture 37 - Tutorial-6  
Lecture 38 - Learning Objectives for week 7  
Lecture 39 - Substitution and Elimination - Part 1  
Lecture 40 - Substitution and Elimination - Part 2  
Lecture 41 - Substitution and Elimination - Part 3  
Lecture 42 - Substitution and Elimination - Part 4  
Lecture 43 - Substitution and Elimination - Part 5  
Lecture 44 - Tutorial-7  
Lecture 45 - Learning Objectives for week 8  
Lecture 46 - Alcohols - Part 1  
Lecture 47 - Alcohols - Part 2  
Lecture 48 - Alcohols - Part 3  
Lecture 49 - Ethers and Epoxides - Part 1  
Lecture 50 - Ethers and Epoxides - Part 2  
Lecture 51 - Aromaticity  
Lecture 52 - Tutorial-8

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Quantitative Methods in Chemistry

Subject Co-ordinator - Prof. Aasheesh Srivastava, Prof. Bharathwaj Sathyamoorthy

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - A brief history of the beginnings of quantitation in Chemistry, defining chemical stoichiometry and
- Lecture 2 - Defining Molality and Normality, relationship with Molarity
- Lecture 3 - Defining other parameters for concentration (% , ppm/ppb, p-value)
- Lecture 4 - Relationship between various concentration parameters
- Lecture 5 - Problems on acid-base equilibria, calculation of pH of strong and weak acids
- Lecture 6 - Brief introduction to normal distribution and statistical analysis
- Lecture 7 - Using a spreadsheet towards basic statistical analysis, exact equation of error propagation, accuracy
- Lecture 8 - Error propagation and its application to a few examples, significant figures
- Lecture 9 - Introduction to use spreadsheets to analyze errors, reiteration of significant figures, repeats accuracy
- Lecture 10 - Classification of errors
- Lecture 11 - A look at uncertainties in a measurement taking an example
- Lecture 12 - A comprehensive and step-wise look at an experimental protocol towards understanding systematic errors
- Lecture 13 - Introductory Statistics - Part 1
- Lecture 14 - Introductory Statistics - Part 2
- Lecture 15 - Hypothesis testing and Finding Outliers - Part 1
- Lecture 16 - Hypothesis testing and Finding Outliers - Part 2
- Lecture 17 - Pooling of data
- Lecture 18 - Introduction to Analysis of Variance (ANOVA) and comparing precisions
- Lecture 19 - Protocol for undertaking ANOVA - Part 1
- Lecture 20 - Protocol for undertaking ANOVA - Part 2
- Lecture 21 - ANOVA and Least Significant Difference (LSD)
- Lecture 22 - ANOVA and solved Least Significant Difference example
- Lecture 23 - Using spreadsheet software to perform data analysis towards calibrating a burette
- Lecture 24 - Using spreadsheet to analyze linear dependence between two variables
- Lecture 25 - Using spreadsheet and MATLAB towards data analysis with example of rate kinetics
- Lecture 26 - Simulating simple straight lines and kinetic curves using MATLAB
- Lecture 27 - Simulating the Michaelis Menten kinetics using MATLAB
- Lecture 28 - Curve fitting and simulating with variance for the Michaelis Menten kinetics using MATLAB
- Lecture 29 - Standards and Volumetric/Gravimetric titrations - Part 1

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- Lecture 30 - Standards and Volumetric/Gravimetric titrations - Part 2
- Lecture 31 - Standards and Volumetric/Gravimetric titrations - Part 3
- Lecture 32 - Standards and Volumetric/Gravimetric titrations - Part 4
- Lecture 33 - Standards and Volumetric/Gravimetric titrations - Part 5
- Lecture 34 - Analytical Separations - Multistage extractions - Part 1
- Lecture 35 - Analytical Separations - Multistage extractions - Part 2
- Lecture 36 - Analytical Separations - Chromatography - Part 1
- Lecture 37 - Analytical Separations - Chromatography - Part 2
- Lecture 38 - Analytical Separations - Electrophoresis, Capillary electrophoresis, Isoelectric Focusing
- Lecture 39 - Basics of Chromatography - Part 1
- Lecture 40 - Basics of Chromatography - Part 2
- Lecture 41 - Chromatography - Concept of Theoretical plates
- Lecture 42 - Chromatography - Rate Theory
- Lecture 43 - Practice of Chromatography - HPLC
- Lecture 44 - Practice of Chromatography - Gas Chromatography
- Lecture 45 - Supercritical Fluid Chromatography
- Lecture 46 - Detectors employed during chromatographic separations
- Lecture 47 - Course Revision
- Lecture 48 - Course Revision - Week 1 to 3
- Lecture 49 - Course Revision - Week 4 and 5
- Lecture 50 - Course Revision - Week 6 and 7
- Lecture 51 - Course Revision - Week 8 to 11

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

NPTEL Video Course - Chemistry and Biochemistry - NOC: Fundamentals of Spectroscopy

Subject Co-ordinator - Prof. Sayan Bagchi, Prof. Anirban Hazra

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to Spectroscopy  
Lecture 2 - Introduction to Quantum Mechanics - I  
Lecture 3 - Introduction to Quantum Mechanics - II  
Lecture 4 - A Simple Quantum Mechanical System  
Lecture 5 - Spectroscopic Transitions  
Lecture 6 - Intensity of a Transition Depends on the Transition Dipole Moment - I  
Lecture 7 - Intensity of a Transition Depends on the Transition Dipole Moment - II  
Lecture 8 - Comparison between Chemical Reactions and Spectroscopic Transitions  
Lecture 9 - Lineshape Analysis  
Lecture 10 - Different Forms of Spectroscopy  
Lecture 11 - Spectroscopic Timescales  
Lecture 12 - Correspondence between Linear Motion and Rotational Motion  
Lecture 13 - Diatomic Rigid Rotor  
Lecture 14 - Selection Rules and Rotational Spectrum  
Lecture 15 - Isotope effect  
Lecture 16 - Degeneracy  
Lecture 17 - Intensities of Rotational Lines  
Lecture 18 - Non Rigid Rotor  
Lecture 19 - Polyatomic Molecules - I  
Lecture 20 - Polyatomic Molecules - II and Numericals  
Lecture 21 - Origin of the Rotational Selection Rule  
Lecture 22 - Simple Harmonic Oscillator  
Lecture 23 - Energy Levels  
Lecture 24 - Selection Rules  
Lecture 25 - Anharmonicity  
Lecture 26 - Effects of Anharmonicity  
Lecture 27 - Ro-vibrational Spectrum - I  
Lecture 28 - Ro-vibrational Spectrum - II  
Lecture 29 - Harmonic Oscillator Eigenvalues and Eigenfunctions - I

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- Lecture 30 - Harmonic Oscillator Eigenvalues and Eigenfunctions - II
- Lecture 31 - Vibration of a Diatomic Molecule and Derivation of the Vibrational Selection Rule
- Lecture 32 - Ro-vibrational Spectrum - III
- Lecture 33 - Vibration of Polyatomic Molecules - I
- Lecture 34 - Vibration of Polyatomic Molecules - II
- Lecture 35 - Vibration of Polyatomic Molecules - III
- Lecture 36 - Normal Mode Coordinates
- Lecture 37 - Introduction to Raman Spectroscopy
- Lecture 38 - Quantum theory of Raman effect
- Lecture 39 - Rotational Raman Spectroscopy
- Lecture 40 - Nuclear Spin Statistics
- Lecture 41 - Polarizability and Polarizability Ellipsoid
- Lecture 42 - Raman Activity of Vibrations
- Lecture 43 - Vibrational Raman Spectroscopy
- Lecture 44 - Polarization Effects and Numericals
- Lecture 45 - Resonance Spectroscopy - Introduction 1
- Lecture 46 - Resonance Spectroscopy - Introduction 2
- Lecture 47 - NMR Spectroscopy - 1
- Lecture 48 - NMR Spectroscopy - 2
- Lecture 49 - NMR Spectroscopy - 3
- Lecture 50 - NMR Spectroscopy - 4
- Lecture 51 - NMR Spectroscopy - 5
- Lecture 52 - NMR Spectroscopy - 6
- Lecture 53 - ESR Spectroscopy - 1
- Lecture 54 - ESR Spectroscopy - 2
- Lecture 55 - ESR Spectroscopy - 3
- Lecture 56 - ESR Spectroscopy - 4
- Lecture 57 - Electronic Spectroscopy - 1
- Lecture 58 - Electronic Spectroscopy - 2
- Lecture 59 - Electronic Spectroscopy - 3
- Lecture 60 - Electronic Spectroscopy - 4
- Lecture 61 - Electronic Spectroscopy - 5

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Symmetry, Stereochemistry and Applications

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 stereochemistry  
Lecture 2 - Nomenclature of Various Organic Molecules  
Lecture 3 - Nomenclature of Cyclic molecules and other functional groups  
Lecture 4 - Nomenclature of some complex molecules  
Lecture 5 - Practising naming of molecules  
Lecture 6 - Symmetry, Stereochemistry and Applications  
Lecture 7 - Symmetry elements in organic molecules  
Lecture 8 - Molecular point groups - Part I  
Lecture 9 - Molecular point groups - Part II  
Lecture 10 - Conformations and Configurations  
Lecture 11 - Conformational Analysis - Part I  
Lecture 12 - Conformational Analysis - Part II  
Lecture 13 - Chair and Boat Conformation of Cyclohexane  
Lecture 14 - Conformational Analysis of Disubstituted Cyclohexane Molecules  
Lecture 15 - Isomerism and Representation of Isomers  
Lecture 16 - Stereoisomerism  
Lecture 17 - Drawing One Projection from Another  
Lecture 18 - Optical Activity of Organic Molecules and Isomerism  
Lecture 19 - Allenes and Biphenyls  
Lecture 20 - Absolute Configuration in Biphenyls and D/L Systems  
Lecture 21 - Asymmetry and Dissymmetry Molecules  
Lecture 22 - Stereoisomerism and Local Symmetry  
Lecture 23 - Topicity of Ligands  
Lecture 24 - Topicity of Faces  
Lecture 25 - Problems on Isomers and Topicity  
Lecture 26 - Diastereomerism in Ring System - Part 1  
Lecture 27 - Diastereomerism in Ring System - Part 2  
Lecture 28 - Diastereomerism in Ring System - Part 3  
Lecture 29 - Diastereomerism in PI System

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

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- Lecture 30 - Nucleophilic Reactions
- Lecture 31 - Mechanism of Nucleophilic Substitution Reaction
- Lecture 32 - Stability of Carbocation
- Lecture 33 - Elimination Reactions
- Lecture 34 - Substitution VS Elimination Reactions
- Lecture 35 - Addition Reactions to Alkenes and Alkynes - Part 1
- Lecture 36 - Addition Reactions to Alkenes and Alkynes - Part 2
- Lecture 37 - Oxidizing Agents in Organic Chemistry and Organometallic Compounds
- Lecture 38 - Some Problems and their Answers in Stereochemistry
- Lecture 39 - Dynamic Stereochemistry - Part 1
- Lecture 40 - Dynamic Stereochemistry - Part 2
- Lecture 41 - Reaction Specificity and Selectivity
- Lecture 42 - Cram's Rule and Felkin-Anh Model
- Lecture 43 - Kinetics of Organic Reactions
- Lecture 44 - Name Reactions and Their Mechanism - Part 1
- Lecture 45 - Name Reactions and Their Mechanism - Part 2
- Lecture 46 - Modifications of Diels-Alder Reaction
- Lecture 47 - Name Reactions and Their Mechanism - Part 3
- Lecture 48 - Name Reactions and Their Mechanism - Part 4
- Lecture 49 - Rearrangement Reactions in Organic Chemistry - Part 1
- Lecture 50 - Rearrangement Reactions in Organic Chemistry - Part 2
- Lecture 51 - Rearrangement Reactions in Organic Chemistry - Part 3
- Lecture 52 - Rearrangement Reactions in Organic Chemistry - Part 4
- Lecture 53 - Brief introduction to crystallographic symmetry
- Lecture 54 - Symmetries in X-ray Crystallography
- Lecture 55 - 2D lattices and space groups
- Lecture 56 - 3D crystallographic point groups and space groups

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Symmetry and Group Theory (2021)

Subject Co-ordinator - Prof. Jeetender Chugh

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Course Contents  
Lecture 2 - Symmetry and Parity Operator  
Lecture 3 - Symmetry Elements and Operations - Part 1  
Lecture 4 - Symmetry Elements and Operations - Part 2  
Lecture 5 - Planes and Reflections  
Lecture 6 - Tutorial - 1  
Lecture 7 - Coordinate System and Inversion Center  
Lecture 8 - Improper axis and improper rotation  
Lecture 9 - Solved Examples of Symmetry Elements and Operations  
Lecture 10 - Product of Symmetry Operations  
Lecture 11 - Tutorial - 2  
Lecture 12 - Symmetry Point Groups - Part 1  
Lecture 13 - Symmetry Point Groups - Part 2  
Lecture 14 - Symmetry Point Groups - Part 3  
Lecture 15 - Dipole Moment and Optical Activity  
Lecture 16 - Tutorial - 3  
Lecture 17 - Point Group Definition and Examples  
Lecture 18 - Sub-Group and Classes  
Lecture 19 - Matrix Representation of Symmetry Operations  
Lecture 20 - Matrix Representation of Point Group  
Lecture 21 - Tutorial - 4  
Lecture 22 - Matrix Representation of Point Group  
Lecture 23 - Reducible and Irreducible Representations  
Lecture 24 - Great Orthogonality Theorem  
Lecture 25 - Properties of Great Orthogonality Theorem  
Lecture 26 - Tutorial - 5  
Lecture 27 - Irreducible Representation using GOT  
Lecture 28 - Reducible to Irreducible Representation using GoT  
Lecture 29 - Character Table and Mulliken Symbols

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

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- Lecture 30 - How to write a complete character table
- Lecture 31 - Tutorial - 6
- Lecture 32 - Representations of a cyclic group
- Lecture 33 - Group Theory and Quantum Mechanics
- Lecture 34 - 1) Degenerate Eigen Functions 2) Direct Product
- Lecture 35 - Direct Product
- Lecture 36 - Tutorial - 7
- Lecture 37 - Direct Product Applications - Part 1
- Lecture 38 - Direct Product Applications - Part 2
- Lecture 39 - Symmetry Adapted Linear Combinations - Part 1
- Lecture 40 - Symmetry Adapted Linear Combinations - Part 2
- Lecture 41 - Tutorial - 8
- Lecture 42 - Incomplete Projection Operator
- Lecture 43 - SALC using Projection Operator
- Lecture 44 - Symmetry and Chemical Bonding
- Lecture 45 - Valence Bond Theory
- Lecture 46 - Tutorial - 9
- Lecture 47 - Molecular Orbital Theory
- Lecture 48 - Localised MO Theory
- Lecture 49 - Delocalized MO Theory - Part 1
- Lecture 50 - Delocalized MO Theory - Part 2
- Lecture 51 - Ascent and Descent in Symmetry - Part 1
- Lecture 52 - Ascent and Descent in Symmetry - Part 2
- Lecture 53 - Crystal Field Theory - Part 1
- Lecture 54 - Crystal Field Theory - Part 2
- Lecture 55 - Jahn-Teller Distortion - Part 1
- Lecture 56 - Jahn-Teller Distortion - Part 2
- Lecture 57 - Introduction to Spectroscopy - Part 1
- Lecture 58 - Introduction to Spectroscopy - Part 2
- Lecture 59 - Vibrational Spectroscopy
- Lecture 60 - 1) Raman Spectroscopy and 2) Atomic Motions
- Lecture 61 - Symmetry of Normal Modes of Vibration
- Lecture 62 - Visualizing Molecular Vibrations using Internal Coordinates
- Lecture 63 - Spectral Transition Probabilities - Part 1
- Lecture 64 - Spectral Transition Probabilities - Part 2

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

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

Subject Co-ordinator - Prof. Harinath Chakrapani

Co-ordinating Institute - IISER - Pune

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

Lecture 1 - Introduction - 1  
Lecture 2 - Essentials of NMR Spectroscopy - Part 1  
Lecture 3 - Essentials of NMR Spectroscopy - Part 2  
Lecture 4 - Essentials of NMR Spectroscopy - Part 3  
Lecture 5 - Electrophilic Aromatic Substitution - Part 1  
Lecture 6 - Electrophilic Aromatic Substitution - Part 2  
Lecture 7 - Electrophilic Aromatic Substitution - Part 3  
Lecture 8 - Tutorial - 1  
Lecture 9 - Introduction - 2  
Lecture 10 - Electrophilic Aromatic Substitution in Phenols  
Lecture 11 - EAS\_Effect of Electron Donating group  
Lecture 12 - EAS\_Effect of Electron Withdrawing group  
Lecture 13 - Nucleophilic aromatic substitution - Part 1  
Lecture 14 - Nucleophilic aromatic substitution - Part 2  
Lecture 15 - Special Topic\_Hammond's Postulate  
Lecture 16 - Tutorial-2 - Part 1  
Lecture 17 - Tutorial-2 - Part 2  
Lecture 18 - Essentials of IR Spectroscopy  
Lecture 19 - Introduction - 3  
Lecture 20 - Basics of Carbonyl Compounds  
Lecture 21 - Addition Reactions on Carbonyl functional group  
Lecture 22 - Addition Reactions on Carbonyl functional group  
Lecture 23 - Nucleophilic Addition Reactions and its stereochemistry  
Lecture 24 - Nucleophilic Addition Reactions and its Stereochemistry  
Lecture 25 - Tutorial - 3  
Lecture 26 - Introduction - 4  
Lecture 27 - Carboxylic acid and its derivatives - Part 1  
Lecture 28 - Carboxylic acid and its derivatives - Part 2  
Lecture 29 - Reactions of Carboxylic acid and its derivatives

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

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- Lecture 30 - Alcohols, Ethers, and Epoxides
- Lecture 31 - Tutorial - 4
- Lecture 32 - Special Topic - E1CB reaction
- Lecture 33 - Introduction - 5
- Lecture 34 - Enols and Enolates\_Intro
- Lecture 35 - Enols and Enolates\_Molecular Orbital Picture
- Lecture 36 - Reactions of Enols and Enolates
- Lecture 37 - Tutorial - 5A
- Lecture 38 - Tutorial - 5B
- Lecture 39 - Introduction - 6
- Lecture 40 - Active methylene group
- Lecture 41 - Aldol and related Reactions
- Lecture 42 - Aldol Reactions: Specific enol equivalents - Part 1
- Lecture 43 - Aldol Reactions: Specific enol equivalents - Part 2
- Lecture 44 - Tutorial - 6
- Lecture 45 - Introduction - 7
- Lecture 46 - Conjugate Addition:1,2-addition and 1,4-addition
- Lecture 47 - Conjugate Addition: Kinetic versus thermodynamic products
- Lecture 48 - Conjugate Addition: Hard and Soft nucleophiles
- Lecture 49 - Enol and Enolate alkylation
- Lecture 50 - Regioselectivity of alkylation reactions
- Lecture 51 - Acylation of enol/enolates and related Name Reactions
- Lecture 52 - Tutorial-7: Felkin-Ahn Problems
- Lecture 53 - Introduction - 8
- Lecture 54 - Rearrangements - Part 1
- Lecture 55 - Rearrangements - Part 2
- Lecture 56 - Rearrangements - Part 3
- Lecture 57 - Rearrangements - Part 4
- Lecture 58 - Named Reactions - Part 1
- Lecture 59 - Named Reactions - Part 2
- Lecture 60 - Tutorial - 8
- Lecture 61 - Conclusion

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Elementary Electrochemistry

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 Elementary Electrochemistry
- Lecture 2 - The Laws of Electrochemistry and Electrolysis
- Lecture 3 - Applications of Faraday's Laws of Electrolysis
- Lecture 4 - Electrolytic Conduction: Arrhenius Theory of Electrolytic Dissociation
- Lecture 5 - Electrochemical/Galvanic Cell: Construction and Cell Reactions
- Lecture 6 - Numerical Problems on Faraday's Laws of Electrolysis
- Lecture 7 - Estimation of EMF of a Cell Using Potentiometer
- Lecture 8 - EMF of a Cell and Free Energy Change of a Reaction
- Lecture 9 - EMF of a Cell and Equilibrium Constant of a Reaction: The Nernst Equation
- Lecture 10 - Various Types of Electrodes (Glass, SHE, Calomel) in Electrochemistry
- Lecture 11 - Electrode Potential and Applications of Nernst Equation
- Lecture 12 - Numerical Problems: Nernst Equation, EMF of Half Cell Reactions
- Lecture 13 - Measurement of Cell EMF
- Lecture 14 - Electrochemical Cells: Liquid Junction Potential
- Lecture 15 - Electrolytic Solutions: Determination of Activity Coefficient
- Lecture 16 - Theory of Potentiometric Titrations
- Lecture 17 - Preparation of Primary Standard and Standardization of NaOH
- Lecture 18 - Potentiometric Titration of Strong Acid and Strong Base
- Lecture 19 - Potentiometric Titration of Weak Acid with Strong Base
- Lecture 20 - Potentiometric Titration of Dibasic Acid with Strong Base
- Lecture 21 - Experimental Calculation of Potentiometric Titrations
- Lecture 22 - Conductance and Conductivity of the Solution
- Lecture 23 - Experimental Methods to Determine Transport Number
- Lecture 24 - Experimental Method to Calculate Transport Number
- Lecture 25 - Electrolytic Solutions
- Lecture 26 - Conductance Measurement
- Lecture 27 - Variation of Conductance with Concentration
- Lecture 28 - Ionic Mobilities in terms of ion Conductivities
- Lecture 29 - Application of Conductance Measurement - Part 1

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

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- Lecture 30 - Application of Conductance Measurement - Part 2
- Lecture 31 - Activities in Electrolytic Solutions
- Lecture 32 - Ionic Strength of an Electrolyte and its Importance
- Lecture 33 - Hydration of Ions and Their Ionic Mobility
- Lecture 34 - Solubility and Activity Product
- Lecture 35 - Applications of EMF and Conductance Measurement
- Lecture 36 - Dissociation Constant of Weak Acids
- Lecture 37 - Conductometric Titrations of Strong Acid with Strong Base
- Lecture 38 - Conductometric Titrations of Weak Acid with Strong Base
- Lecture 39 - Estimation of HCl and Ammonium Chloride in a Triple Mixture using NaOH
- Lecture 40 - Estimation of Total Chloride ion Concentration in Triple Mixture using Primary Standard AgNO<sub>3</sub>
- Lecture 41 - Validation of Ostwald Dilution Law using HCl
- Lecture 42 - Validation of Ostwald Dilution Law using Acetic Acid
- Lecture 43 - Calculation and Graph Plotting for Conductometric Experiments

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Organic Chemistry-I (Tamil)

Subject Co-ordinator - Prof. Srinivasan Venkataraman

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Phenols Structure, Preparation, Properties and Reactions - Part 1  
Lecture 2 - Phenols Structure, Preparation, Properties and Reactions - Part 2  
Lecture 3 - Phenols Structure, Preparation, Properties and Reactions - Part 3  
Lecture 4 - Phenols Structure, Preparation, Properties and Reactions - Part 4  
Lecture 5 - Phenols Structure, Preparation, Properties and Reactions - Part 5  
Lecture 6 - Phenols Structure, Preparation, Properties and Reactions - Part 6  
Lecture 7 - Phenol Assignment I and II - Part 7  
Lecture 8 - Carbonyl Compounds - Part 1  
Lecture 9 - Carbonyl Compounds - Part 2 (Continued...)  
Lecture 10 - Carbonyl Compounds - Part 3 (Continued...)  
Lecture 11 - Carbonyl Compounds - Part 4 (Continued...)  
Lecture 12 - Carbonyl Compounds Assignment I and II - Part 5  
Lecture 13 - Carboxylic Acids - Part 1  
Lecture 14 - Functional Derivatives - Part 2  
Lecture 15 - Appendices I and II - Part 3  
Lecture 16 - Carboxylic Acids - Assignment I and II - Part 4  
Lecture 17 - Nitro Compounds  
Lecture 18 - Amines Structure, Preparation and Properties - Part 1  
Lecture 19 - Amines Appendices I to IV - Part 1 (Continued...)  
Lecture 20 - Assignments I to II - Part 2  
Lecture 21 - Green Chemistry Introduction - Part 1  
Lecture 22 - Green Chemistry Terminologies and strategies in green chemistry - Part 2 (Continued...)  
Lecture 23 - Approches to Less Polluting Reactions - Part 3  
Lecture 24 - Biocatalysis - Part 4  
Lecture 25 - Microwave mediated and photochemical reactions and conclusion - Part 5  
Lecture 26 - Acknowledgement

## 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

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

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

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

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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  $\pi$ 2 bonding  
Lecture 14 - Metal dihydrogen and hydrides  
Lecture 15 - Migratory Insertion reaction with alkynes  
Lecture 16 -  $\eta^m$  (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 -  $\pi$ 3 complexes-synthesis, bonding  
Lecture 23 - Metal-allyls -  $\eta^3$  complexes-fluxionality, reactivity  
Lecture 24 - C-C single bond forming reactions  
Lecture 25 -  $\pi$ 5 Cyclopentadienyl - complexes  
Lecture 26 -  $\eta^6$  arene Metal complexes  
Lecture 27 - Half sandwich complexes  
Lecture 28 - Reactivity changes in coordinated ligands  
Lecture 29 - The isolobal analogy

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

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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  $^1\text{H}$  NMR spectra of molecules - I  
Lecture 19 - Analysis of 1D  $^1\text{H}$  NMR spectra of molecules - II  
Lecture 20 - 1D  $^{13}\text{C}$  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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## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

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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

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Multidimensional NMR Spectroscopy for Structural Studies

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 - Energy levels in NMR spectroscopy
- Lecture 3 - Observing the NMR signal
- Lecture 4 - Basic concepts in 1D NMR
- Lecture 5 - Basic concepts in 1D NMR
- Lecture 6 - Basic concepts in 2D NMR spectroscopy
- Lecture 7 - Principles of 2D correlation spectroscopy COSY
- Lecture 8 - Principles of 2D Total correlation spectroscopy (TOCSY)
- Lecture 9 - 2D Nuclear Overhauser Effect Spectroscopy (NOESY)
- Lecture 10 - 2D NOESY and 2D ROESY
- Lecture 11 - Principles of 2D Heteronuclear NMR
- Lecture 12 - 2D Heteronuclear NMR
- Lecture 13 - Heteronuclear multiple quantum coherence (HMQC) and single quantum coherence (HSQC) - Part I
- Lecture 14 - Heteronuclear multiple quantum coherence (HMQC) and single quantum coherence (HSQC) - Part II
- Lecture 15 - 2D HSQC-TOCSY
- Lecture 16 - 3D NMR Spectroscopy - Part I
- Lecture 17 - 3D NMR Spectroscopy - Part II
- Lecture 18 - 3D HNCA and 3D HNCO
- Lecture 19 - 3D HNCACB and 3D HN(CO)CACB
- Lecture 20 - Protein Backbone resonance assignment and side chain resonance assignment
- Lecture 21 - Basic concepts of protein structure
- Lecture 22 - Introduction to Structure Determination of Bio-Molecules by NMR
- Lecture 23 - Over-expression of proteins in Bacteria
- Lecture 24 - Isotope labeling of proteins for NMR studies - Part I
- Lecture 25 - Isotope labeling of proteins for NMR studies - Part II
- Lecture 26 - Isotope labeling of proteins for NMR studies - Part III
- Lecture 27 - Isotope labeling of proteins for NMR studies - Part IV
- Lecture 28 - Resonance assignments of Proteins - Part I
- Lecture 29 - Resonance assignments of Proteins - Part II

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

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- Lecture 30 - Resonance assignments of Proteins - Part III
- Lecture 31 - Determination of protein secondary structure from NMR data
- Lecture 32 - Determination of protein secondary structure from NMR data
- Lecture 33 - Determination of protein tertiary structure from NMR data - Part I
- Lecture 34 - 3D NOESY HSQC
- Lecture 35 - Determination of protein tertiary structure from NMR data - Part II
- Lecture 36 - Understanding Protein ligand interaction by NMR
- Lecture 37 - Understanding Protein ligand interaction by NMR
- Lecture 38 - Understanding Protein ligand interaction by NMR
- Lecture 39 - Understanding Protein ligand interaction by NMR
- Lecture 40 - Understanding Protein ligand interaction by NMR
- Lecture 41 - Understanding Protein ligand interaction by NMR
- Lecture 42 - Understanding Protein ligand interaction by NMR

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Symmetry and Structure in the Solid State

Subject Co-ordinator - Prof. T. N. Guru Row

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Symmetry in 3D World  
Lecture 2 - Two Fold Axis Representation with the Help of Esher Diagrams  
Lecture 3 - Pure Rotation Axes  
Lecture 4 - Properties of Crystal  
Lecture 5 - Point Group Generation  
Lecture 6 - Combination of Symmetry Elements  
Lecture 7 - Arrangement of Symmetry Equivalent Objects  
Lecture 8 - Introduction to Plane Lattices  
Lecture 9 - Bravais Lattices  
Lecture 10 - Details of Stereographic Projections  
Lecture 11 - Stereographic Projections (Continued)  
Lecture 12 - Point Group and Crystal Systems - 1  
Lecture 13 - Point Group and Crystal Systems - 2  
Lecture 14 - Point Groups to Space Groups  
Lecture 15 - Translation components in Monoclinic System  
Lecture 16 - Additional Symmetry Elements  
Lecture 17 - Additional Symmetry Elements (Continued...)  
Lecture 18 - Space Groups - 1  
Lecture 19 - Space Groups - 2  
Lecture 20 - Space Groups - 3  
Lecture 21 - Space Groups - 4  
Lecture 22 - Additional Information on Space Groups  
Lecture 23 - Details of Space Groups - 1  
Lecture 24 - Details of Space Groups - 2  
Lecture 25 - Details of Space Groups - 3  
Lecture 26 - Details of Space Groups - 4  
Lecture 27 - Crystal Structure of Calcium Carbonate  
Lecture 28 - Crystal Structure of Some Minerals  
Lecture 29 - Atoms in the Crystal

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

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- Lecture 30 - Crystallographic Directions and Planes
- Lecture 31 - Interference of Waves
- Lecture 32 - X Ray Scattering ; optical Analogy
- Lecture 33 - X Ray Scattering ; Fourier transforms
- Lecture 34 - X Ray Scattering ; Deriving Laue Conditions from scattering theory
- Lecture 35 - X Ray Scattering ; Laue conditions to Bragg's Law, Introduction to Reciprocal lattice
- Lecture 36 - Bragg's Law in Reciprocal Space - 1
- Lecture 37 - Bragg's Law in Reciprocal Space - 2
- Lecture 38 - Calculation of Intensities - 1
- Lecture 39 - Calculation of Intensities - 2
- Lecture 40 - Conversion from Direct to reciprocal space, the inverse relations
- Lecture 41 - Diffraction and Reciprocal Space (Continued...)
- Lecture 42 - Limits of Resolution
- Lecture 43 - Concept of Structure Factors
- Lecture 44 - Systematic Absences - 1
- Lecture 45 - Systematic Absences - 2
- Lecture 46 - Systematic Absences - 3
- Lecture 47 - Friedel's Law and Laue classes
- Lecture 48 - Experimental Aspects of Data Collection
- Lecture 49 - Structure Determination - 1
- Lecture 50 - Structure Determination - 2
- Lecture 51 - Data Reduction
- Lecture 52 - Fourier Syntheses
- Lecture 53 - Patterson Method - 1
- Lecture 54 - Patterson Method - 2
- Lecture 55 - Direct Method
- Lecture 56 - Powder Diffraction - 1
- Lecture 57 - Powder Diffraction - 2
- Lecture 58 - Powder Diffraction - 3
- Lecture 59 - Quantum Crystallography - 1
- Lecture 60 - Quantum Crystallography - 2
- Lecture 61 - Intermolecular Interactions



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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Ultrafast Optics and Spectroscopy

Subject Co-ordinator - Prof. Atanu Bhattacharya

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1  
Lecture 2  
Lecture 3  
Lecture 4  
Lecture 5  
Lecture 6  
Lecture 7  
Lecture 8 - Nonlinear Effects  
Lecture 9 - Nonlinear Effects (Continued...)  
Lecture 10 - Nonlinear Effects (Continued...)  
Lecture 11 - Nonlinear Effects (Continued...)  
Lecture 12 - Nonlinear Effects (Continued...)  
Lecture 13 - Nonlinear Effects (Continued...)  
Lecture 14 - Nonlinear Effects (Continued...)  
Lecture 15 - Dispersion Effects  
Lecture 16 - Nonlinear and Dispersion Effects (Continued...)  
Lecture 17 - Nonlinear and Dispersion Effects (Continued...)  
Lecture 18 - Transverse Electromagnetic Mode  
Lecture 19 - Transverse Electromagnetic Mode (Continued...)  
Lecture 20 - Construction of Ultrafast Laser  
Lecture 21 - Construction of Ultrafast Laser (Continued...)  
Lecture 22 - Construction of Ultrafast Laser (Continued...)  
Lecture 23 - Measurement of Ultrafast Pulse  
Lecture 24 - Measurement of Ultrafast Pulse (Continued...)  
Lecture 25 - Measurement Techniques in Ultrafast Spectroscopy  
Lecture 26 - Kinetic Model of Ultrafast Spectroscopy  
Lecture 27 - Kinetic Model of Ultrafast Spectroscopy (Continued...)  
Lecture 28 - Quantum Mechanical Model of Ultrafast Spectroscopy  
Lecture 29 - Ultrafast Physical Chemistry

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

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Lecture 30 - Ultrafast Physical Chemistry  
Lecture 31 - Ultrafast Physical Chemistry  
Lecture 32 - Maxwell's Equations  
Lecture 33 - Maxwell's Equations (Continued...)  
Lecture 34 - Ab Initio Molecular Dynamics - 1  
Lecture 35 - Ab Initio Molecular Dynamics - 2  
Lecture 36 - Ab Initio Molecular Dynamics - 3  
Lecture 37 - Ab Initio Molecular Dynamics - 4  
Lecture 38 - Attosecond Chemical Dynamics - 1  
Lecture 39 - Attosecond Chemical Dynamics - 2  
Lecture 40 - Attosecond Chemical Dynamics - 3  
Lecture 41 - Attosecond Chemical Dynamics - 4  
Lecture 42 - Femtochemistry of Nanocatalysis - 1  
Lecture 43 - Femtochemistry of Nanocatalysis - 2

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:One and two dimensional NMR Spectroscopy for Chemists

Subject Co-ordinator - Prof. N. Suryaprakash

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - NMR an historical perspective and NMR active nuclei  
Lecture 2 - Spin Angular Momentum and Magnetic moment  
Lecture 3 - Interaction of Spins with the magnetic field  
Lecture 4 - Larmor Precession and Energy of interaction  
Lecture 5 - NMR detection and sensitivity  
Lecture 6 - Inducing Resonance and Bulk Magnetization  
Lecture 7 - Signal detection and Rotating Frame Concept  
Lecture 8 - Pulse phase and signal phase  
Lecture 9 - FID and Fourier Transformation  
Lecture 10 - Selection rules and transitions  
Lecture 11 - External and Internal interactions in NMR  
Lecture 12 - Chemical Shifts  
Lecture 13 - NMR Spectrum and chemical equivalence  
Lecture 14 - Conversion of frequency and ppm  
Lecture 15 - Field dependence and factors affecting chemical shift  
Lecture 16 - Factors contributing to chemical shifts - 1  
Lecture 17 - Factors contributing to chemical shifts - 2  
Lecture 18 - Scalar Couplings - 1  
Lecture 19 - Scalar Couplings - 2  
Lecture 20 - Energy levels of coupled spins  
Lecture 21 - Spin system classification and multiplicity  
Lecture 22 - Multiplicity pattern of coupled spins  
Lecture 23 - Active and passive coupling  
Lecture 24 - Coupling among equivalent spins - 1  
Lecture 25 - Coupling among equivalent spins - 2  
Lecture 26 - Coupling among non-equivalent spins  
Lecture 27 - Geminal and Vicinal couplings  
Lecture 28 - Spin system Nomenclature  
Lecture 29 - Isotope effect

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

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- Lecture 30 - Analysis of Strongly coupled spin systems
- Lecture 31 - Eigen values of A2 and AMX spin systems
- Lecture 32 - Analysis of Three spin coupled systems
- Lecture 33 - Analysis of Proton NMR spectra - 1
- Lecture 34 - Analysis of Proton NMR spectra - 2
- Lecture 35 - Analysis of Proton NMR spectra - 3
- Lecture 36 - Basics of <sup>13</sup>C-NMR
- Lecture 37 - Coupled and Decoupled <sup>13</sup>C-Spectra
- Lecture 38 - Broadband decoupling in <sup>13</sup>C-NMR
- Lecture 39 - Analysis of <sup>13</sup>C spectra and DEPT
- Lecture 40 - Heteronuclear couplings and satellite analysis - 1
- Lecture 41 - Heteronuclear couplings and satellite analysis - 2
- Lecture 42 - Coupling among magnetic equivalent nuclei and isotope effect
- Lecture 43 - Analysis of spectra of other nuclei
- Lecture 44 - Spin Echoes
- Lecture 45 - Polarization transfer techniques
- Lecture 46 - INEPT and DEPT
- Lecture 47 - Decoupling and NOE
- Lecture 48 - NOE-2
- Lecture 49 - Introduction to 2D NMR
- Lecture 50 - Two-dimensional NMR
- Lecture 51 - Two dimensional NMR
- Lecture 52 - Two dimensional COSY
- Lecture 53 - COSY and examples
- Lecture 54 - Variants of COSY and TOCSY spectra
- Lecture 55 - Heteronuclear correlation and inverse detection
- Lecture 56 - Coupled and decoupled HSQC and HMBC
- Lecture 57 - NMR data acquisition - 1
- Lecture 58 - NMR data acquisition - 2
- Lecture 59 - Practical considerations of 1D NMR
- Lecture 60 - NMR Data processing
- Lecture 61 - NMR Data processing
- Lecture 62 - NMR Instrumentation - 1
- Lecture 63 - NMR Instrumentation - 2
- Lecture 64 - Relaxation processes - 1
- Lecture 65 - Relaxation processes - 2

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:Time Dependent Quantum Chemistry

Subject Co-ordinator - Prof. Atanu Bhattacharya

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction to TDSE  
Lecture 2 - Solution to TDSE, Stationary and Non-stationary States  
Lecture 3 - Electron and Vibrational Superposition States  
Lecture 4 - Optical Analogy to Quantum Superposition  
Lecture 5 - Introduction to Python Programming  
Lecture 6 - Simple Computation with Python Programming  
Lecture 7 - Plotting Graph with Python Programming  
Lecture 8 - Meaning of Probability Density  
Lecture 9 - Time Evolution of Normalization Constant  
Lecture 10 - Expectation Value and its Time Evolution  
Lecture 11 - Equation of Continuity  
Lecture 12 - Bohmian Mechanics  
Lecture 13 - Bohmian Mechanics and Standard Interpretation  
Lecture 14 - Grid Representation of Wavefunction  
Lecture 15 - Normalizing the Discretized Wavefunction and Finding Expectation Value  
Lecture 16 - Plane Matter Wave and Wavepacket  
Lecture 17 - Wavepacket  
Lecture 18 - Stationary Gaussian Wavepacket  
Lecture 19 - Travelling Gaussian Wavepacket  
Lecture 20 - General Form of the Gaussian Wavepacket  
Lecture 21 - Fourier Transform of a wavefunction  
Lecture 22 - x-grid to k-grid  
Lecture 23 - Fourier Transform using fft  
Lecture 24 - Hilbert Space and Its Properties  
Lecture 25 - Basis Set Approach to Quantum Mechanics  
Lecture 26 - Matrix Algebra  
Lecture 27 - Eigenvalue and Eigenfunction  
Lecture 28 - Matrix Representation of Operators  
Lecture 29 - Matrix Representation of Hamiltonian Operator

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- Lecture 30 - Python Tutorial 4 (Eigenvalue and Eigenfunction)
- Lecture 31 - Python Tutorial 4 (Eigenvalue and Eigenfunction)
- Lecture 32 - Time Evolution Operator
- Lecture 33 - Split Operator Metho
- Lecture 34 - Numerical Implementation of Split Operator Method
- Lecture 35 - Wavepacket Dynamics under zero interaction potential
- Lecture 36 - Wavepacket Dynamics under zero interaction potential (Continued...)
- Lecture 37 - Wavepacket Dynamics under linear interaction potential
- Lecture 38 - Quantum Adiabatic Theory
- Lecture 39 - Formal Derivation of Quantum Adiabatic
- Lecture 40 - Geometric Phase and Dynamical Phase
- Lecture 41 - Nonradiative Transition - Part 1
- Lecture 42 - Nonradiative Transition - Part 2
- Lecture 43 - Nonradiative Transition
- Lecture 44 - Quantum Dissipative Dynamics
- Lecture 45 - Quantum Dissipative Dynamics
- Lecture 46 - Formal Derivation of Dissipative Quantum Dynamics
- Lecture 47 - Classical Description of Light
- Lecture 48 - Vector and Scalar Potential
- Lecture 49 - Vector and Scalar Potential
- Lecture 50 - Master Equation of Light
- Lecture 51 - Hamiltonian for Light-Atom Interaction
- Lecture 52 - Hamiltonian for Light-Atom Interaction
- Lecture 53 - Absorption and Stimulated Emission
- Lecture 54 - Absorption and Stimulated Emission
- Lecture 55 - Time Correlation Function
- Lecture 56 - Fourier Transform of Time Correlation Function

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

NPTEL Video Course - Chemistry and Biochemistry - NOC:One and Two Dimensional NMR Spectroscopy: Concepts and

Subject Co-ordinator - Prof. N. Suryaprakash

Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Nuclear Spin  
Lecture 2 - NMR spin physics - I  
Lecture 3 - NMR spin physics - II  
Lecture 4 - Energy levels and allowed transitions  
Lecture 5 - Transitions in coupled spin systems  
Lecture 6 - Interaction parameters  
Lecture 7 - Chemical Shifts  
Lecture 8 - Shielding and deshielding, ppm and frequency scales  
Lecture 9 - Factors affecting the chemical shifts  
Lecture 10 - Scalar couplings  
Lecture 11 - Scalar couplings  
Lecture 12 - Coupling mechanism  
Lecture 13 - Splitting patterns  
Lecture 14 - Multiplicity patterns  
Lecture 15 - Analysis of multiplicity patterns  
Lecture 16 - Coupled spin system  
Lecture 17 - Nomenclature for coupled spins  
Lecture 18 - Energy levels of two and three coupled spins  
Lecture 19 - Analysis of  $^1\text{H}$  NMR spectra - I  
Lecture 20 - Analysis of  $^1\text{H}$  NMR spectra - II  
Lecture 21 - Analysis of  $^1\text{H}$  NMR spectra - III  
Lecture 22 - Coupling of  $^1\text{H}$  with other nuclei - I  
Lecture 23 - Coupling of  $^1\text{H}$  with other nuclei - II  
Lecture 24 -  $^{13}\text{C}$ -NMR - I  
Lecture 25 -  $^{13}\text{C}$ -NMR - II  
Lecture 26 -  $^{13}\text{C}$ -NMR - III  
Lecture 27 -  $^{13}\text{C}$ -NMR - IV  
Lecture 28 - Analysis of  $^{19}\text{F}$  spectra  
Lecture 29 -  $^{31}\text{P}$  NMR

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

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- Lecture 30 - Analysis of spectra of Heteronuclei
- Lecture 31 - Heteronuclear spectral analysis
- Lecture 32 - Spin Echoes - I
- Lecture 33 - Spin Echoes - II
- Lecture 34 - Sensitivity enhancement
- Lecture 35 - Polarization transfer
- Lecture 36 - INEPT
- Lecture 37 - 2D NMR - I
- Lecture 38 - 2D NMR - II
- Lecture 39 - 2D-COSY - I
- Lecture 40 - 2D COSY - II
- Lecture 41 - Types of COSY spectra
- Lecture 42 - TOCSY
- Lecture 43 - HSQC - I
- Lecture 44 - HSQC - II
- Lecture 45 - me-HSQC
- Lecture 46 - HSQC and HMBC
- Lecture 47 - HMBC - II
- Lecture 48 - 2D INADEQUATE
- Lecture 49 - 2D-INADEQUATE and 2D J-Resolved
- Lecture 50 - Homo and Heteronuclear J-resolved
- Lecture 51 - Conceptual understanding of NOE
- Lecture 52 - Positive and negative NOE
- Lecture 53 - NOE and correlation times
- Lecture 54 - Complications in NOE, Steady state NOE
- Lecture 55 - ROESY and Tr NOE
- Lecture 56 - Combined utility of COSY, TOCSY, HSQC, NOESY
- Lecture 57 - Steady State NOE
- Lecture 58 - 1D NOE, 1D TOCSY
- Lecture 59 - 1D-TOCSY, PURESIFT
- Lecture 60 - PURSHIFT NMR