NPTEL : Advanced Chemical Reaction Engineering (PG) (Chemical Engineering)

Co-ordinators : Prof. H.S. Shankar

NPTEL : Advanced Process Control (Chemical Engineering)

Co-ordinators : Prof. Sachin C. Patwardhan

NPTEL : Chemical Reaction Engineering II (Chemical Engineering)

Co-ordinators : Prof. A.K. Suresh, Prof. Ganesh A. Viswanathan, Prof. Sanjay M. Mahajani

NPTEL : Advanced Numerical Analysis (Chemical Engineering)

Co-ordinators : Prof. Sachin C. Patwardhan

NPTEL : NOC:Introduction to Evolutionary Dynamics (Chemical Engineering)

Co-ordinators : Prof. Supreet Saini

NPTEL : NOC:Heat Transfer (Chemical Engineering)

Co-ordinators : Prof. Ganesh A. Viswanathan

Lecture 32 - Flow through Pipes - IV - Mixing-cup Temperature

Lecture 33 - Flow through Pipes - V - Log mean Temperature Difference

Lecture 34 - Flow through Pipes - VI - Correlations for Laminar and Turbulent Conditions

Lecture 35 - Example problems : Forced Convection

Lecture 36 - Introduction to Free/Natural Convection

Lecture 37 - Heated Plate in a Quiescent Fluid - I

Lecture 38 - Heated Plate in a Quiescent Fluid - II

Lecture 39 - Boiling - I

Lecture 40 - Boiling - II

Lecture 41 - Condensation - I

Lecture 42 - Condensation - II

Lecture 43 - Radiation : Introduction

Lecture 44 - Spectral Intensity

Lecture 45 - Radiation : Spectral properties, Blackbody

Lecture 46 - Properties of a Blackbody

Lecture 47 - Surface Adsorption

Lecture 48 - Kirchoffâ€™s Law

Lecture 49 - Radiation Exchange - View Factor

Lecture 50 - View Factor Examples

Lecture 51 - View Factor - Inside Sphere Method, Blackbody Radiation Exchange

Lecture 52 - Diffuse, Gray Surfaces in an Enclosure

Lecture 53 - Resistances - Oppenheim Matrix Method

Lecture 54 - Resistances - Examples

Lecture 55 - More Examples: Volumetric Radiation

Lecture 56 - Introduction and Examples

Lecture 57 - Parallel Flow Heat Exchangers

Lecture 58 - LMTD I

Lecture 59 - Shell and Tube Heat Exchangers

Lecture 60 - Epsilon-NTU Method

NPTEL : NOC:Chemical Reaction Engineering-II (Chemical Engineering)

Co-ordinators : Prof. Ganesh Vishwanathan

Lecture 32 - Overall effectiveness factor - II

Lecture 33 - Identification of internal diffusion and reaction-limited regimes

Lecture 34 - Packed-bed reactor design

Lecture 35 - Generalized criterion for diffusion and reaction-limited conditions

Lecture 36 - Network of first order reactions

Lecture 37 - Use of experimental data

Lecture 38 - Packed-bed reactor design: External and Internal resistances

Lecture 39 - Fluidized bed reactor design - I

Lecture 40 - Fluidized bed reactor design - II

Lecture 41 - Fluidized bed reactor design - III

Lecture 42 - Fluidized bed reactor design - IV

Lecture 43 - Fluid-solid noncatalytic reactions - I

Lecture 44 - Fluid-solid noncatalytic reactions - II

Lecture 45 - Fluid-solid noncatalytic reactions - III

Lecture 46 - Fluid-solid noncatalytic reactions - IV

Lecture 47 - Fluid-solid noncatalytic reactions - V

Lecture 48 - Fluid-solid noncatalytic reactions - VI

Lecture 49 - Residence time distribution (RTD): Introduction

Lecture 50 - RTD: Non-ideal reactors

Lecture 51 - Measurement of RTD - I

Lecture 52 - Measurement of RTD - II

Lecture 53 - RTD function

Lecture 54 - Properties of RTD function

Lecture 55 - Reactor diagnostics and troubleshooting - I

Lecture 56 - Reactor diagnostics and troubleshooting - II

Lecture 57 - Modeling nonideal reactors - I

Lecture 58 - Modeling nonideal reactors - II

Lecture 59 - Non-ideal reactors: Zero parameter models - I

Lecture 60 - Non-ideal reactors: Zero parameter models - II

NPTEL : NOC:Chemical Process Control (Chemical Engineering)

Co-ordinators : Prof. Sujit Jogwar

NPTEL : NOC:Introduction to Interfacial Waves (Chemical Engineering)

Co-ordinators : Prof. Ratul Dasgupta

NPTEL : NOC:Hydrogen Energy: Production, Storage, Transportation and Safety (Chemical Engineering)

Co-ordinators : Prof. Pratibha Sharma

Lecture 65 - Properties of Hydrogen Associated with Accidents

Lecture 66 - Classification of Hydrogen related Hazards

Lecture 67 - Compressed and Liquid Hydrogen Related Hazards

Lecture 68 - Regulations, Codes and Standards

Lecture 69 - Utilisation in Different Sectors, Global Status and Future Directions

NPTEL : NOC:Modeling Stochastic Phenomena for Engineering Applications: Part-1 (Chemical Engineering)

Co-ordinators : Prof. Yelia Shankaranarayana Mayya

NPTEL : Heterogeneous Catalysis and Catalytic Processes (Chemical Engineering)

Co-ordinators : Dr. K.K. Pant

NPTEL : Interfacial Engineering (Chemical Engineering)

Co-ordinators : Prof. A.N. Bhaskarwar

NPTEL : NOC:Fluid Mechanics and its Applications (Chemical Engineering)

Co-ordinators : Prof. Vijay Gupta

Lecture 65 (31A)

NPTEL : NOC:Computational Process Design (Chemical Engineering)

Co-ordinators : Prof. Manojkumar Ramteke, Prof. Hariprasad Kodamana

NPTEL : Heat Transfer (Chemical Engineering)

Co-ordinators : Prof. A.K. Ghoshal

NPTEL : Mass Transfer Operations I (Chemical Engineering)

Co-ordinators : Dr. B. Mandal

NPTEL : Process Design Decisions and Project Economics (Chemical Engineering)

Co-ordinators : Dr. Vijay S. Moholkar

NPTEL : NOC:Fluidization Engineering (Chemical Engineering)

Co-ordinators : Dr. S.K. Majumder

NPTEL : NOC:An Introduction to Cardiovascular Fluid Mechanics (Chemical Engineering)

Co-ordinators : Dr. Raghvendra Gupta

NPTEL : NOC:Multiphase Microfluidics (Chemical Engineering)

Co-ordinators : Dr. Raghvendra Gupta

NPTEL : NOC:Measurement Technique in Multiphase Flows (Chemical Engineering)

Co-ordinators : Prof. Rajesh Kumar Upadhyay

NPTEL : NOC:Multiphase Flows (Chemical Engineering)

Co-ordinators : Prof. Rajesh Kumar Upadhyay

NPTEL : NOC:Introduction to Polymer Physics (IIT-G) (Chemical Engineering)

Co-ordinators : Prof. Amit Kumar

NPTEL : NOC:Natural Gas Engineering (Chemical Engineering)

Co-ordinators : Prof. Pankaj Tiwari

NPTEL : NOC:Chemical Engineering Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Sasidhar Gumma

NPTEL : NOC:Mass Transfer Operations-I (Chemical Engineering)

Co-ordinators : Dr. B. Mandal

NPTEL : NOC:Transport Phenomena of Non-Newtonian Fluids (Chemical Engineering)

Co-ordinators : Prof. N. Kishore

NPTEL : NOC:Fluid Flow Operations (Chemical Engineering)

Co-ordinators : Dr. S.K. Majumder

NPTEL : NOC:Chemical Process Intensification (Chemical Engineering)

Co-ordinators : Dr. S.K. Majumder

NPTEL : NOC:Chemical Reaction Engineering-I (Chemical Engineering)

Co-ordinators : Dr. B. Mandal

NPTEL : NOC:Mass Transfer Operations-II (Chemical Engineering)

Co-ordinators : Dr. Chandan Das

Lecture 1 - Basic concepts, Adiabatic saturation temperature

Lecture 2 - Design calculations of cooling tower

Lecture 3 - Design of cooling tower

Lecture 4 - Design of cooling tower

Lecture 5 - Air conditioning, Example problems on dehumidification

Lecture 6 - Mechanism of drying and drying equilibria, drying rate curve

Lecture 7 - Drying: rate of drying for batch dryers

Lecture 8 - Drying: rate of drying for continuous dryers

Lecture 9 - Drying time calculation from drying rate curve

Lecture 10 - Introduction to liquid-liquid extraction, liquid-liquid equilibria

Lecture 11 - Effect of temperature on LLE and Design of single stage extraction

Lecture 12 - Design Calculation of Multistage Operation

Lecture 13 - Design calculation of multistage cross-current extraction

Lecture 14 - Design calculation of multistage counter-current extraction, Selection of extractors

Lecture 15 - Leaching: single stage operation

Lecture 16 - Leaching: multistage operation

Lecture 17 - Supercritical Fluid Extraction, equipmet for leaching

Lecture 18 - Fundamentals of membrane separation processes

Lecture 19 - Manufacturing of membranes,advantages and limitations

Lecture 20 - Various models and applications: design aspects

Lecture 21 - Various models and applications: design aspects

Lecture 22 - Electric field enhanced membrane separation processes

Lecture 23 - Micellar-enhanced ultrafiltration

Lecture 24 - Adsorption: types and nature, isotherm

Lecture 25 - Stage wise and continuous adsorption

Lecture 26 - Fluidized bed and teeter bed

Lecture 27 - Unsteady state fixed bed adsorbers, ion exchange

Lecture 28 - Crystallization, types of crystal geometry

Lecture 29 - Solid-liquid phase equilibrium, Theory of crystallization

Lecture 30 - Design of crystallizer, crystallization equipment

Lecture 31 - Concluding remarks - Part 1

Lecture 32 - Concluding remarks - Part 2

NPTEL : NOC:Mechanical Unit Operations (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

NPTEL : NOC:Advanced Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

NPTEL : NOC:Membrane Technology (Chemical Engineering)

Co-ordinators : Prof. Kaustubha Mohanty

NPTEL : NOC:Computer Aided Applied Single Objective Optimization (Chemical Engineering)

Co-ordinators : Prof. Prakash Kotecha

Lecture 32 - Branch and Bound Method for MILP

Lecture 33 - MILP formulation of Production Planning Problem

Lecture 34 - Generalized Algebraic Modelling System

Lecture 35 - Solution of Production Planning Problem using GAMS and NEOS, MIRO

Lecture 36 - IBM ILOG CPLEX Optimization Studio

Lecture 37 - Constraint Programming Applications in IBM ILOG CPLEX Optimization Studio

NPTEL : NOC:Basic Principles and Calculations in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Subrata Kumar Majumdar

NPTEL : NOC:Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems (Chemical Engineering)

Co-ordinators : Prof. R. Anandalakshmi, Prof. Vaibhav Vasant Goud

NPTEL : NOC:Biomass Conversion and Biorefinery (Chemical Engineering)

Co-ordinators : Prof. Kaustubha Mohanty

NPTEL : NOC:Aspen PlusÂ® Simulation Software - A basic course for beginners (Chemical Engineering)

Co-ordinators : Prof. Prabirkumar Saha

NPTEL : NOC:Physical and Electrochemical Characterizations in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Tamal Banerjee

NPTEL : NOC:Chemical Process Technology (Chemical Engineering)

Co-ordinators : Prof. Tamal Banerjee

NPTEL : NOC:Inorganic Chemical Technology (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

NPTEL : NOC:Organic Chemical Technology (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

NPTEL : NOC:Solid-Fluid Operations (Chemical Engineering)

Co-ordinators : Prof. Subrata Kumar Majumder

NPTEL : NOC:Energy Conversion Technologies (Biomass and Coal) (Chemical Engineering)

Co-ordinators : Prof. Vaibhav V. Goud

NPTEL : NOC:Petroleum Reservoir Engineering (Chemical Engineering)

Co-ordinators : Dr. Pankaj Tiwari

NPTEL : NOC:Applied Statistical Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Tamal Banerjee

NPTEL : Fluid Mechanics (Chemical Engineering)

Co-ordinators : Dr. V. Shankar

NPTEL : Mass Transfer II (Chemical Engineering)

Co-ordinators : Prof. Nishith Verma

NPTEL : Plantwide Control of Chemical Processes (Chemical Engineering)

Co-ordinators : Dr. Nitin Kaistha

NPTEL : NOC:Thermodynamics Of Fluid Phase Equilibria (Chemical Engineering)

Co-ordinators : Dr. Jayant K. Singh

NPTEL : NOC:Chemical Engineering Thermodynamics (2019) (Chemical Engineering)

Co-ordinators : Dr. Jayant K. Singh

NPTEL : Biochemical Engineering (Chemical Engineering)

Co-ordinators : Dr. Saikat Chakraborty, Dr. Rintu Banerjee

NPTEL : Microscale Transport Processes (Chemical Engineering)

Co-ordinators : Dr. Somnath Ganguly, Prof. S. Dasgupta

NPTEL : Multiphase Flow (Chemical Engineering)

Co-ordinators : Prof. P.K. Das, Prof. Gargi Das

NPTEL : Novel Separation Processes (Chemical Engineering)

Co-ordinators : Prof. S. De

NPTEL : Process Control and Instrumentation (Chemical Engineering)

Co-ordinators : Dr. D. Sarkar, Dr. A.K. Jana

NPTEL : Instability and Patterning of Thin Polymer Films (Chemical Engineering)

Co-ordinators : Dr. R. Mukherjee

NPTEL : Advanced Mathematical Techniques in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. S. De

NPTEL : NOC:Introduction to Process Modeling in Membrane Separation Process (Chemical Engineering)

Co-ordinators : Prof. S. De

NPTEL : NOC:Soft Nano Technology (Chemical Engineering)

Co-ordinators : Dr. R. Mukherjee

NPTEL : NOC:Adiabatic Two-Phase Flow & Flow Boiling in Microchannel (Chemical Engineering)

Co-ordinators : Prof. Gargi Das

NPTEL : NOC:Phase Equilibrium Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Gargi Das

Lecture 32 - Tutorial 4

Lecture 33 - Partial molar properties

Lecture 34 - Partial molar properties (Continued...)

Lecture 35 - Partial molar fugacity

Lecture 36 - Ideal solutions

Lecture 37 - Ideal solutions (Continued...)

Lecture 38 - Ideal solutions (Continued...)

Lecture 39 - Ideal solutions (Continued...)

Lecture 40 - Non-ideal solutions

Lecture 41 - Non-ideal solutions (Continued...)

Lecture 42 - Non-ideal solutions (Continued...)

Lecture 43 - Non-ideal solutions (Continued...)

Lecture 44 - Non-ideal solutions (Continued...)

Lecture 45 - Deviations from ideal dilute solutions

Lecture 46 - Tutorial 5

Lecture 47 - Tutorial 6

Lecture 48 - Thermodynamics Consistency Test of VLE Data

Lecture 49 - Retrograde Condensation

Lecture 50 - Partial and Complete Immiscibility of Liquid Mixtures

Lecture 51 - Partial and Complete Immiscibility of Liquid Mixtures (Continued...)

Lecture 52 - Phase Equilibrium for Mass Transfer Processes

Lecture 53 - Control Mass Analysis of Transient process

Lecture 54 - Control Volume Analysis

Lecture 55 - Throttling and problem

Lecture 56 - Tutorial 7

Lecture 57 - First Law for reacting systems

Lecture 58 - Estimation of standard heat of reaction

Lecture 59 - Effect of operating variables on heat of reaction

Lecture 60 - Chemical Reaction Equilibrium

Lecture 61 - Equilibrium constant and its estimation

Lecture 62 - Relation of Equilibrium constant to composition

Lecture 63 - Effect of operating conditions on equilibrium conversion

Lecture 64 - Relation of Equilibrium constant to composition (Continued...)

Lecture 65 - Miscellaneous concepts on Reaction Equilibrium

NPTEL : NOC:Transport Phenomena (Chemical Engineering)

Co-ordinators : Prof. Sunando Dasgupta

NPTEL : NOC:Chemical Process Instrumentation (Chemical Engineering)

Co-ordinators : Prof. Debasis Sarkar

NPTEL : NOC:Optimization in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Debasis Sarkar

NPTEL : NOC:Heat Transfer (2018) (Chemical Engineering)

Co-ordinators : Prof. Sunando Dasgupta

NPTEL : NOC:Flow through Porous Media (Chemical Engineering)

Co-ordinators : Dr. Somnath Ganguly

NPTEL : NOC:Fundamentals of Particle and Fluid Solid Processing (Chemical Engineering)

Co-ordinators : Prof. Arnab Atta

NPTEL : NOC:Plant Design and Economics (Chemical Engineering)

Co-ordinators : Prof. Debasis Sarkar

NPTEL : NOC:Material and Energy Balance Computations (Chemical Engineering)

Co-ordinators : Prof. Arnab Atta

NPTEL : NOC:Principles and Practices of Process Equipment and Plant Design (Chemical Engineering)

Co-ordinators : Prof. Gargi Das

NPTEL : NOC:Mathematical Modelling and Simulation of Chemical Engineering Process (Chemical Engineering)

Co-ordinators : Prof. Sourav Mondal

NPTEL : NOC:Advanced Process Dynamics (Chemical Engineering)

Co-ordinators : Prof. Parag A. Deshpande

Lecture 1 - Introduction and motivation

Lecture 2 - Dynamics of linear first order autonomous systems

Lecture 3 - Dynamics of linear first order autonomous systems (Continued...)

Lecture 4 - Lumped parameter analysis of cooling of a body

Lecture 5 - Lumped parameter analysis of cooling of a body (Continued...)

Lecture 6 - Introduction to higher order systems

Lecture 7 - Phase plane analysis of linear autonomous second order systems

Lecture 8 - Phase plane analysis of linear autonomous second order systems (Continued...)

Lecture 9 - Analysis of a free spring-mass system

Lecture 10 - Analysis of a free spring-mass system (Continued...)

Lecture 11 - Dynamics of non-autonomous systems

Lecture 12 - Similarity solution for non-autonomous higher order dynamics

Lecture 13 - Similarity solution for non-autonomous higher order dynamics (Continued...)

Lecture 14 - Analysis of a forced spring-mass system

Lecture 15 - Analysis of a forced spring-mass system (Continued...)

Lecture 16 - Phase portraits of linear autonomous systems of order three and higher

Lecture 17 - Phase portraits of linear autonomous systems of order three and higher (Continued...)

Lecture 18 - Analysis of complex reaction systems

Lecture 19 - Analysis of complex reaction systems (Continued...)

Lecture 20 - Analysis of complex reaction systems (Continued...)

Lecture 21 - Introduction to non-linear systems

Lecture 22 - Logistic population growth model

Lecture 23 - Logistic population growth model (Continued...)

Lecture 24 - Logistic population growth with harvesting

Lecture 25 - Logistic population growth with harvesting (Continued...)

Lecture 26 - Logistic population growth with threshold population

Lecture 27 - Logistic population growth with threshold population (Continued...)

Lecture 28 - Analysis of population dynamics in discrete domain

Lecture 29 - Analysis of fixed points and bifurcation in discrete domain

Lecture 30 - Analysis of fixed points and bifurcation in discrete domain (Continued...)

Lecture 31 - More on bifurcations in non-linear systems

NPTEL : NOC:Metallocene and Metal-Carbene based Organometallic Compounds as Industrially Important Advanced Polyolefin Catalysts (Chemical Engineering)

Co-ordinators : Prof. Sanjib K. Patra

NPTEL : NOC:Chemical Engineering Fluid Dynamics and Heat Transfer (Chemical Engineering)

Co-ordinators : Prof. Rabibrata Mukherjee, Prof. Arnab Atta

NPTEL : NOC:Characterization of Polymers, Elastomers and Composites (Chemical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

NPTEL : NOC:Matlab-Based Programming Lab in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Parag A. Deshpande

NPTEL : NOC:Petroleum Technology (Chemical Engineering)

Co-ordinators : Dr. Sonali Sengupta

NPTEL : NOC:Rheology and Processing of Paints, Plastic and Elastomer Based Composites (Chemical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

NPTEL : NOC:Petroleum Formation Evaluation (Chemical Engineering)

Co-ordinators : Dr. Neetish Kumar Maurya, Dr. Sayantan Ghosh

NPTEL : NOC:Momentum Transfer in Fluids (Chemical Engineering)

Co-ordinators : Prof. Somenath Ganguly, Prof. Sunando DasGupta

NPTEL : Chemical Engineering Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. M.S. Ananth

NPTEL : Computational Fluid Dynamics (Chemical Engineering)

Co-ordinators : Prof. Sreenivas Jayanti

Lecture 26 - Convergence analysis of basic iterative schemes; Diagonal dominance condition for convergence; Influence of source terms on the diagonal dominance condition; Rate of convergence

Lecture 27 - Application to the Laplace equation

Lecture 28 - Advanced iterative methods: Alternating Direction Implicit Method; Operator splitting

Lecture 29 - Advanced iterative methods; Strongly Implicit Proc edure; Conjugate gradient method; Multigrid method

Lecture 30 - Illustration of the Multigrid method for the Laplace equation

Lecture 31 - Overview of the approach of numerical solution of NS equations for simple domains; Introduction to complexity arising from physics and geometry

Lecture 32 - Derivation of the energy conservation equation

Lecture 33 - Derivation of the species conservation equation; dealing with chemical reactions

Lecture 34 - Turbulence; Characteri stics of turbulent flow; Dealing with fluctuations and the concept of time-averaging

Lecture 35 - Derivation of the Reynolds -averaged Navier -Stokes equations; identification of the closure problem of turbulence; Boussinesq hypothesis and eddy viscosity

Lecture 36 - Reynol ds stresses in turbulent flow; Time and length scales of turbulence; Energy cascade; Mixing length model for eddy viscosity

Lecture 37 - One-equation model for turbulent flow

Lecture 38 - Two -equation model for turbulent flow; Numerical calculation of turbulent reacting flows

Lecture 39 - Calculation of near-wall region in turbulent flow; wall function approach; near-wall turbulence models

Lecture 40 - Need for special methods for dealing with irregular flow geometry; Outline of the Body-fitted grid approach ; Coordinate transformation to a general, 3-D curvilinear system

Lecture 41 - Transformation of the governing equations; Illustration for the Laplace equation; Appearance and significance of cross - derivative terms; Concepts of structured and unstructured grids.

Lecture 42 - Finite vol ume method for complicated flow domain; Illustration for the case of flow through a duct of triangular cross - section.

Lecture 43 - Finite volume method for the general case

Lecture 44 - Generation of a structured grid for irregular flow domain; Algebraic methods; Elliptic grid generation method

Lecture 45 - Unstructured grid generation; Domain nodalization; Advancing front method for triangulation

Lecture 46 - Delaunay triangulation method for unstructured grid generation

Lecture 47 - Co -located grid approach for irregular geometries; Pressure correction equation for a co -located structured grid; Pressure correction equation for a co-located unstructured grid.

NPTEL : Computational Techniques (Chemical Engineering)

Co-ordinators : Dr. Niket S. Kaisare

NPTEL : Particle Characterization (PG) (Chemical Engineering)

Co-ordinators : Dr. R. Nagarajan

NPTEL : Statistics for Experimentalists (Chemical Engineering)

Co-ordinators : Dr. A. Kannan

NPTEL : Multiphase flows:Analytical solutions and Stability Analysis (Chemical Engineering)

Co-ordinators : Prof. S. Pushpavanam

NPTEL : NOC:Introduction to Time-Frequency Analysis and Wavelet Transforms (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

NPTEL : Chemical Engineering Principles of CVD Processes (Chemical Engineering)

Co-ordinators : Dr. R. Nagarajan

Lecture 32 - Undesirable CVD: Moolten Salt Deposition in Combustion Systems (Adobe Presenter)

Lecture 33 - Undesirable CVD: Hot Corrosion (Adobe Presenter)

Lecture 34 - Multi-component Transport Fundamentals: Assumptions and Control Volumes (Adobe Presenter)

Lecture 35 - Multi-component Transport Fundamentals: Mass Conservation Equations (Adobe Presenter)

Lecture 36 - Multi-component Transport Fundamentals: Momentum and Energy Conservation (Adobe Presenter)

Lecture 37 - Multi-component Transport Fundamentals: Entropy conservation (Adobe Presenter)

Lecture 38 - Multi-component Transport Fundamentals: Constitutive Laws for Mass and Momentum (Adobe Presenter)

Lecture 39 - Multi-component Transport Fundamentals: Constitutive Laws for Energy and Entropy (Adobe Presenter)

NPTEL : Chemical Reaction Engineering 1 (Homogeneous Reactors) (Chemical Engineering)

Co-ordinators : Prof K. Krishnaiah

Lecture 1 - Motivation and Introduction - Part I

Lecture 2 - Motivation and Introduction - Part II

Lecture 3 - What is Chemical Engineering - Part I

Lecture 4 - What is Chemical Engineering - Part II

Lecture 5 - What is Chemical Reaction Engineering - Part I

Lecture 6 - What is Chemical Reaction Engineering - Part II

Lecture 7 - Homogeneous and Heterogeneous Reactions - Part I

Lecture 8 - Homogeneous and Heterogeneous Reactions - Part II

Lecture 9 - Basics of Kinetics and Contacting

Lecture 10 - Design of Batch reactors - Part I

Lecture 11 - Design of Batch reactors - Part II

Lecture 12 - Basics of Plug Flow Reactor - Part I

Lecture 13 - Basics of Plug Flow Reactor - Part II

Lecture 14 - Design of Plug Flow Reactors - Part I

Lecture 15 - Design of Plug Flow Reactors - Part II

Lecture 16 - Basics of Mixed Flow Reactors

Lecture 17 - Design of Mixed Flow Reactors

Lecture 18 - Basics of Kinetics

Lecture 19 - Kinetics of Heterogeneous reactions - Part I

Lecture 20 - Kinetics of Heterogeneous reactions - Part II

Lecture 21 - Kinetics of Heterogeneous reactions - Part III

Lecture 22 - Kinetics of Homogeneous reactions

Lecture 23 - Reaction rate for Homogeneous reactions

Lecture 24 - Gas Phase Homogeneous reactions

Lecture 25 - (Continued...) And later Reactor Design of PFR

Lecture 26 - Reactor Design for MFR and Combination of reactors

Lecture 27 - PFR and MFR in series.

Lecture 28 - Unsteady state MFR and PFR

Lecture 29 - Recycle Reactors

Lecture 30 - Recycle Reactors (Autocatalytic reactions) - Part I

Lecture 31 - Recycle Reactors (Autocatalytic reactions) - Part II

NPTEL : Chemical Reaction Engineering 2 (Heterogeneous Reactors) (Chemical Engineering)

Co-ordinators : Prof K. Krishnaiah

NPTEL : NOC:MATLAB Programming for Numerical Computation (Chemical Engineering)

Co-ordinators : Dr. Niket S.Kaisare

NPTEL : NOC:Computational Fluid Dynamics (Chemical Engineering)

Co-ordinators : Prof. Sreenivas Jayanti

NPTEL : NOC:Introduction to Statistical Hypothesis Testing (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

NPTEL : NOC:Applied Time-Series Analysis (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

NPTEL : NOC:Rheology of Complex Materials (Chemical Engineering)

Co-ordinators : Dr. Abhijit P. Deshpande

NPTEL : NOC:Process Control - Design, Analysis and Assessment (Chemical Engineering)

Co-ordinators : Prof. Ragunathan Rengasamy

NPTEL : System Identification (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

Lecture 32 - Response-based Description 10

Lecture 33 - Response-based Description 11

Lecture 34 - Response-based Description 12

Lecture 35 - Response-based Description 13

Lecture 36 - Discrete time LTI system 1

Lecture 37 - Discrete time LTI system 2

Lecture 38 - z-Domain Descriptions 1

Lecture 39 - z-Domain Descriptions 2

Lecture 40 - z-Domain Descriptions 3

Lecture 41 - z-Domain Descriptions 4

Lecture 42 - z-Domain Descriptions 5

Lecture 43 - z-Domain Descriptions 6

Lecture 44 - State Space Representation 1

Lecture 45 - State Space Representation 2

Lecture 46 - State Space Representation 3

Lecture 47 - State Space Representation 4

Lecture 48 - Sampled - Data Systems 1

Lecture 49 - Sampled - Data Systems 2

Lecture 50 - Sampled - Data Systems 3

Lecture 51 - Sampled - Data Systems 4

Lecture 52 - Sampled - Data Systems 5

Lecture 53 - Sampled - Data Systems 6

Lecture 54 - Sampled - Data Systems 7

Lecture 55 - Sampled - Data Systems 8

Lecture 56 - Probability_Random variables and moments - Review 1

Lecture 57 - Probability_Random variables and moments - Review 2

Lecture 58 - Probability_Random variables and moments - Review 3

Lecture 59 - Probability_Random variables and moments - Review 4

Lecture 60 - Probability_Random variables and moments - Review 5

Lecture 61 - Probability_Random variables and moments - Review 6

Lecture 62 - Random Processes - Review 1

Lecture 63 - Random Processes - Review 2

Lecture 64 - Random Processes - Review 3

NPTEL : NOC:Fluid and Particle Mechanics (Chemical Engineering)

Co-ordinators : Prof. Basavaraju

NPTEL : NOC:Continuum Mechanics and Transport Phenomena (Chemical Engineering)

Co-ordinators : Prof. T. Renganathan

NPTEL : NOC:Environmental Quality Monitoring and Analysis (Chemical Engineering)

Co-ordinators : Dr. R. Ravi Krishna

Lecture 32 - Monitoring methods for Air - Vapor - Part 3

Lecture 33 - Monitoring and Measurement of Microorganisms

Lecture 34 - Transport of Pollutants - Introduction

Lecture 35 - Transport of Pollutants - Box Models in Water

Lecture 36 - Transport of Pollutants - Box Models in Air

Lecture 37 - Transport of Pollutants - Dispersion

Lecture 38 - Transport of Pollutants - Gaussian Dispersion Model

Lecture 39 - Dispersion Model - Parameters - Part 1

Lecture 40 - Dispersion Model - Parameters - Part 2

Lecture 41 - Gaussian Dispersion Model

Lecture 42 - Gaussian Dispersion Model - Example, Additional topics

Lecture 43 - Regulatory Models

Lecture 44 - Introduction to Interphase Mass Transfer

Lecture 45 - Interphase mass transfer - Application to Environmental Interfaces

Lecture 46 - Interphase mass transfer - Flux and mass transfer resistance

Lecture 47 - Interphase mass transfer - Boundary Layer and Mass Transfer Coefficient

Lecture 48 - Interphase mass transfer - Individual and Overall Mass Transfer Coefficients

Lecture 49 - Overall Mass Transfer Coefficient

Lecture 50 - Estimation of the Mass Transfer Coefficients

Lecture 51 - Air-Water Exchange

Lecture 52 - Evaporation from different surfaces

Lecture 53 - Sediment-Water exchange

Lecture 54 - Application of Interphase mass transfer

Lecture 55 - Contamination of Sediments

Lecture 56 - Release from Sediments

Lecture 57 - Unsteady state release from sediments

Lecture 58 - Other mechanisms of chemical release from sediments - Part 1

Lecture 59 - Other mechanisms of chemical release from sediments - Part 2

Lecture 60 - Soil - Air Transfer

Lecture 61 - Remediation of contaminated sediments - Application of transport models

NPTEL : Synthetic and Natural Supramolecular Architectures: An Approach Towards Molecular Technology (Chemical Engineering)

Co-ordinators : Prof. ChebroluPulla Rao

NPTEL : NOC:Artificial Lift (Chemical Engineering)

Co-ordinators : Prof. Abdus Samad

NPTEL : Chemical Technology - I (Chemical Engineering)

Co-ordinators : Dr. I.D. Mall

Lecture 1 - Introduction to Chemical process Industries

Lecture 2 - Raw material for Organic Chemical Industries

Lecture 3 - Unit processes and unit operations in organic chemical Industries

Lecture 4 - Coal and coal as chemicals feed stock

Lecture 5 - Coal carbonization and Coke oven plant

Lecture 6 - Gasification of Coal,Petrocoke and Biomass

Lecture 7 - Introduction to Pulp and paper Industry, Raw material for paper industry and Technological development

Lecture 8 - Pulping and Bleaching

Lecture 9 - Recovery of Chemicals

Lecture 10 - Stock preparation and paper making

Lecture 11 - Introduction to Soap and detergent, Soap making and Recovery of Glycerine

Lecture 12 - Synthetic detergent and Linear alkyl benzene

Lecture 13 - Sugar and Fermentation industry

Lecture 14 - Ethanol as Biofuel and Chemical feed stock

Lecture 15 - Introduction : Staus of Petroleum refinery, Crude oil and Natural gas origin, occurrence, exploration, drilling and processing, Fuel norms

Lecture 16 - Evaluation of Crude oil,Petroleum Products and Apetrochemicals

Lecture 17 - Crude oil Distillation

Lecture 18 - Thermal Cracking: Visbreaking and Delayed Coking

Lecture 19 - Catalytic cracking: Fluid Catalytic cracking and Hydro cracking

Lecture 20 - Catalytic reforming

Lecture 21 - Alkylation, Isomerisation and Polymerisation

Lecture 22 - Desulphurisation Processes and Recovery of Sulphur

Lecture 23 - Profile of petrochemical Industry and its structure

Lecture 24 - Naphtha and gas cracking for production of olefins

Lecture 25 - Recovery of chemicals from FCC and steam cracking

Lecture 26 - Synthesis gas and its derivatives: Hydrogen, CO, Methanol, Formaldehyde

Lecture 27 - Ethylene derivatives: Ethylene Oxide, Ethylene glycol, Ethylene dichloride and Vinyl chloride

Lecture 28 - Propylene, Propylene oxide and Isopropanol

Lecture 29 - Aromatics Production

Lecture 30 - Aromatics product profile, Ethyl benzene & Styrene, Cumene and phenol, Bisphenol, Aniline

NPTEL : Process Integration (Chemical Engineering)

Co-ordinators : Dr. B. Mohanty

NPTEL : Mechanical Operations (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

NPTEL : NOC:Waste to Energy Conversion (Chemical Engineering)

Co-ordinators : Prof. P. Mondal

Lecture 32 - Tutorial on anaerobic digestion

Lecture 33 - Tutorial on fermentation

Lecture 34 - Energy production from wastes through transesterification - 1

Lecture 35 - Energy production from wastes through transesterification - 2

Lecture 36 - Tutorial on transesterification

Lecture 37 - Cultivation of algal biomass and treatment of waste water - 1

Lecture 38 - Cultivation of algal biomass and treatment of waste water - 2

Lecture 39 - Energy production form algal biomass - 1

Lecture 40 - Energy production form algal biomass - 2

NPTEL : NOC:Unit Operations of Particulate Matter (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

NPTEL : NOC:Introduction to Polymer Physics (IIT-R) (Chemical Engineering)

Co-ordinators : Prof. Prateek Kumar Jha

Lecture 1 - Introduction to the course, Macromolecules and Life, Molecular flexibility

Lecture 2 - Classification of polymers, Types of polymerization, Average molecular weights and polydispersity

Lecture 3 - Motivation to study polymer physics

Lecture 4 - Random Walk Models of Single Chain I: end-to-end distance of a polymer chain, freely jointed chain, drunkard walk

Lecture 5 - Random Walk Models of Single Chain II: general random walk on a lattice

Lecture 6 - Random Walk Models of Single Chain III: Freely rotating chain, definition of persistence length

Lecture 7 - Models of semiflexible chains (Kratky Porod Model) - Part I

Lecture 8 - Models of semiflexible chains (Kratky Porod Model) - Part II

Lecture 9 - Probability density of an ideal chain - Part I

Lecture 10 - Probability density of an ideal chain - Part II

Lecture 11 - Entropic Elasticity, Bead-Spring Model, Simulations of random walk models

Lecture 12 - Derivation of Diffusion equation, Einstein notation

Lecture 13 - Definition of Radius of gyration

Lecture 14 - Radius of gyration for an ideal chain, concept of ideality

Lecture 15 - Nonbonded interactions, hydrophobic and hydrophilic behaviour

Lecture 16 - Definition of excluded volume; good, bad, and theta solvent

Lecture 17 - Virial expansion, Flory theory for good solvent

Lecture 18 - Flory theory for bad solvent, self-similarity and fractal nature of polymers

Lecture 19 - Derivation of fractal dimension, concentration regimes and overlap concentration

Lecture 20 - Size, shape, and structure. Gyration tensor and measures of asphericity.

Lecture 21 - Order-disorder transition

Lecture 22 - Scattering experiments, Pair correlation function

Lecture 23 - Structure of polymer chain, Introduction to Monte Carlo simulations of polymer chains

Lecture 24 - Monte Carlo algorithm: Detailed Balance, Metropolis algorithm

Lecture 25 - Practical aspects of Monte Carlo simulation

Lecture 26 - Molecular Dynamics Simulations, Review of Thermodynamics

Lecture 27 - Solution Thermodynamics - I

Lecture 28 - Solution Thermodynamics - II

Lecture 29 - Solution Thermodynamics - III

Lecture 30 - Solution Thermodynamics - IV

Lecture 31 - Phase separation regime, Introduction to lattice model of solutions

NPTEL : NOC:Equipment Design: Mechanical Aspects (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

NPTEL : NOC:Chemical Process Safety (Chemical Engineering)

Co-ordinators : Dr. Shishir Sinha

NPTEL : NOC:Technologies for Clean and Renewable Energy Production (Chemical Engineering)

Co-ordinators : Prof. P. Mondal

NPTEL : NOC:Polymer Reaction Engineering (Chemical Engineering)

Co-ordinators : Prof. Shishir Sinha

NPTEL : NOC:Process Equipment Design (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

NPTEL : NOC:Advanced Thermodynamics and Molecular Simulations (Chemical Engineering)

Co-ordinators : Prof. Prateek Kumar Jha

Lecture 31 - Interaction energy and force field

Lecture 32 - Liouiville theorem; theoretical basis of Monte Carlo simulation

Lecture 33 - Introduction to Monte Carlo simulation method

Lecture 34 - Markov chain algorithm, condition for equilibrium and detailed balance

Lecture 35 - Metropolis algorithm, periodic boundary condition

Lecture 36 - Numerical implementation of Monte Carlo simulation: Python Examples - I

Lecture 37 - Numerical implementation of Monte Carlo simulation: Python Examples - II

Lecture 38 - Numerical implementation of Monte Carlo simulation: Python Examples - III

Lecture 39 - Numerical implementation of Monte Carlo simulation: Python Examples - IV

Lecture 40 - Numerical implementation of Monte Carlo simulation: Python Examples - V

Lecture 41 - Particle simulations: comparison with quantum chemical and continuum simulations; bridging length and time scales

Lecture 42 - Pair potentials

Lecture 43 - Saving CPU time: short range and long range interactions

Lecture 44 - Bonded and non-bonded interactions, force fields

Lecture 45 - Practical aspects of molecular simulations

Lecture 46 - Numerical implementation of MD; thermostat and barostat

Lecture 47 - MD simulations - efficiency and parallelization, sampling and averaging, analysis of simulation trajectories

Lecture 48 - MD simulations - analysis of simulation trajectories (continued), Case Studies - I

Lecture 49 - MD simulations - Case Studies - II

Lecture 50 - MD simulations - Case Studies - III

Lecture 51 - Free energies and phase behavior; extension of canonical ensemble Monte Carlo to other ensembles

Lecture 52 - Extension of canonical ensemble Monte Carlo to other ensembles (Continued...)

Lecture 53 - Monte Carlo in Gibbs ensemble and semi-grand canonical ensemble, thermodynamic integration

Lecture 54 - Thermodynamic integration (continued); Widom's particle insertion; overlapping distribution method

Lecture 55 - Multiple histogram method; umbrella sampling; thermodynamic cycle; potential of mean force; pulling simulations; metadynamics; tackling time scale issues

Lecture 56 - Tackling time scale issues (continued); nonequilibrium molecular dynamics; mesoscale simulations: Langevin dynamics and Brownian dynamics, kinetic Monte Carlo simulations; dissipative particle dynamics

Lecture 57 - Multiparticle collision dynamics; lattice Boltzmann method; coarse-graining

Lecture 58 - Case studies

Lecture 59 - Simulations of chemical reactions using Kinetic Monte Carlo simulations

Lecture 60 - Reactive force fields; Ab initio molecular dynamics and other advanced methods; molecular simulations in chemical engineering; concluding remarks

NPTEL : NOC:Chemical Process Utilities (Chemical Engineering)

Co-ordinators : Prof. Shishir Sinha

NPTEL : NOC:Physico-Chemical Processes for Waste Water Treatment (Chemical Engineering)

Co-ordinators : Prof. Vimal Chandra Srivastava

NPTEL : NOC:Basic Environmental Engineering and Pollution Abatement (Chemical Engineering)

Co-ordinators : Prof. P. Mondal

NPTEL : NOC:Biological Process Design for Wastewater Treatment (Chemical Engineering)

Co-ordinators : Prof. Vimal Chandra Srivastava

NPTEL : NOC:Advanced Reaction Engineering (Chemical Engineering)

Co-ordinators : Prof. Taraknath Das

Lecture 1 - Introduction

Lecture 2 - Introduction_Various Reactors_BR

Lecture 3 - Design Equation_Continuous reactor (CSTR_PFR_PBR)

Lecture 4 - Design Equation_Continuous reactor (CSTR_PFR_PBR)_Sizing

Lecture 5 - Reaction Rate with Conversion, Temperature, and pressure (Batch/Flow system)

Lecture 6 - Space time Space velocity and CSTRs in series/parallel

Lecture 7 - Effect of Pressure Drop on reactor design (PBR)_(X vs W) and (P vs W)

Lecture 8 - Effect of Pressure Drop on Reactor design (PBR)_(X vs W)_ (P vs W)

Lecture 9 - Effect of Pressure Drop in PBR reactor_Analytical solution of Differential equation

Lecture 10 - Effect of Pressure Drop in PBR reactor_Analytical solution for Reaction With Pressure drop

Lecture 11 - Effect of Pressure Drop in PBR reactor_Example

Lecture 12 - Differential Reactor_rate of reaction_catalyst deactivation

Lecture 13 - Catalyst deactivation

Lecture 14 - Catalyst Deactivation_Temperature (T) - Time (t) trajectories

Lecture 15 - Moving Bed Reactor_Catalyst deactivation

Lecture 16 - STTR_Catalyst deactivation

Lecture 17 - Multi phase reactors-1: Slurry reactor - 1

Lecture 18 - Multi phase reactors-1: Slurry reactor - 2

Lecture 19 - Multi phase reactors-1: Slurry reactor - 3

Lecture 20 - Multi phase reactors-2: Trickle bed reactor - 1

Lecture 21 - Multi phase reactors-2: Trickle bed reactor - 2

Lecture 22 - Multi phase reactors-2: Trickle bed reactor - 3

Lecture 23 - Bioreactor_Cell Growth and Rate laws

Lecture 24 - Bioreactors_Stoichiometry_Yield coefficients_rate of substrate consumption

Lecture 25 - Bioreactors_Example_Yield coefficients and rate law parameters estimation

Lecture 26 - Bioreactors_Mass Balances (Cell, Substrate, Product)

Lecture 27 - Bioreactors_Chemostats

Lecture 28 - Steady State Non Isothermal reactor design_EB equation

Lecture 29 - Steady State Non Isothermal reactor design_Example

Lecture 30 - SS Non Isothermal reactor design_Reaction with Heat Exchange

Lecture 31 - SS Non Isothermal reactor design_Heat Exchange_ T-profile for a few cases

NPTEL : NOC:Polymer Process Engineering (Chemical Engineering)

Co-ordinators : Prof. Shishir Sinha

NPTEL : Chemical Reaction Engineering (Chemical Engineering)

Co-ordinators : Prof. Jayant M Modak

NPTEL : Fundamentals of Transport Processes (Chemical Engineering)

Co-ordinators : Prof. V. Kumaran

NPTEL : Fundamentals of Transport Processes - II (Chemical Engineering)

Co-ordinators : Prof. V. Kumaran

NPTEL : Modern Instrumental Methods of Analysis (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

NPTEL : NOC:Transport Processes I: Heat and Mass Transfer (Chemical Engineering)

Co-ordinators : Prof. V. Kumaran

NPTEL : NOC:Atomic and Molecular Absorption Spectrometry for Pollution Monitoring (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

NPTEL : NOC:Trace and Ultra-trace Analysis of Metals using Atomic Absorption Spectrometry (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

NPTEL : NOC:Inductive Couple Plasma Atomic Emmission Spectrometry for Pollution Monitoring (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

NPTEL : NOC:Infrared Spectroscopy for Pollution Monitoring (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

NPTEL : NOC:Electrochemical Technology in Pollution Control (Chemical Engineering)

Co-ordinators : Prof. J. R. Mudakavi

Lecture 32 - Batteries and fuel cells - 1

Lecture 33 - Batteries and fuel cells - 2

Lecture 34 - Batteries and fuel cells - 3

Lecture 35 - Zero liquid discharge

NPTEL : NOC:Transport Processes (Chemical Engineering)

Co-ordinators : Prof. V Kumaran

Lecture 1 - Dimensions and units

Lecture 2 - Dimensions and units, dimension of an equation

Lecture 3 - Dimensional analysis, settling sphere

Lecture 4 - Dimensional analysis, Brownian diffusivity, torque on a particle

Lecture 5 - Mass transfer to suspended particles

Lecture 6 - Heat transfer in a heat exchanger

Lecture 7 - Momentum transfer, flow in a pipe, friction factor

Lecture 8 - Dimensionless groups - ratio of convection and diffusion

Lecture 9 - Dimensionless fluxes, other dimensionless groups

Lecture 10 - Laminar and turbulent flow in a pipe

Lecture 11 - Flow past flat plate

Lecture 12 - Correlations for drag coefficient

Lecture 13 - Correlations for drag coefficient

Lecture 14 - Flow through packed column

Lecture 15 - Unit operations for mixing

Lecture 16 - Droplet breakup

Lecture 17 - Heat and mass transfer, Colburn and Reynolds analogy

Lecture 18 - Low Peclet number heat/mass transfer, high Peclet number laminar flow

Lecture 19 - High Peclet number laminar/turbulent flows. Flow in pipe, flow past flat plate

Lecture 20 - High Peclet number laminar/turbulent flows. Flow past particle

Lecture 21 - Flow past mobile interfaces, flow in packed column

Lecture 22 - Natural convection

Lecture 23 - Mass diffusion in gases

Lecture 24 - Mass diffusion in gases

Lecture 25 - Mass diffusion in liquids

Lecture 26 - Thermal diffusion

Lecture 27 - Momentum diffusion

Lecture 28 - Dispersion

Lecture 29 - Turbulent dispersion, dispersion in packed column, Taylor dispersion

Lecture 30 - Unidirectional transport. Shell balance

Lecture 31 - Unidirectional transport. Common form of transport equations