



PRINCIPLES AND PRACTICES OF PROCESS EQUIPMENT AND PLANT DESIGN

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IITKGP

PRE-REQUISITES : Mass Transfer, Heat Transfer, Fluid Mechanics, Process instrumentation

INTENDED AUDIENCE : UG students of Chemical Engineering, Biotechnology, Agriculture Engineering, Rookie engineers and fresh entrants to process industries

INDUSTRY SUPPORT: All process industries e.g., oil refineries (IOCL, BPCL, HPCL Reliance, Esser, HMEL), petrochemicals (HPL, Reliance), pharma companies (DRL), etc

COURSE OUTLINE :

The course is expected to impart a holistic approach towards process design i.e. the objective is not to arrive at only the design of individual process equipment, but also to configure it as a complete functional system with its accessories. In other words, it shall deal with process design from the industry perspective. The content will primarily cover the typical mass transfer systems and equipment included in undergraduate curriculum viz. distillation, absorption, adsorption and liquid-liquid extraction along with details of internals in packed and tray columns.

ABOUT INSTRUCTOR :

Prof. Gargi Das is Professor, Department of Chemical Engineering, Indian Institute of Technology Kharagpur, West Bengal. She has been teaching thermodynamics for the past 16 years to the students of Chemical Engg and Biotechnology as a core course. Students from Mechanical Engineering, Agricultural Engineering and Chemistry have opted it as a breadth course. She has contributed to NPTEL through her video based and web based courses on Multiphase Flow and Thermodynamics.

Prof. Subhabrata Ray after superannuating from IIT Kharagpur on 30th June 2020, is currently a fellow (2020-2021) under "Professor B. D. Tilak Visiting Fellowship Endowment" in ICT Mumbai. He is also involved with M/s. Dr. Reddy's Laboratory for assessing their employees, training and R & D activities. He regularly serves as faculty for the training courses for refinery engineers at Rajiv Gandhi Institute of Petroleum Technology, Raebareli. He has co-authored a book on Process Equipment and Plant Design-Principles and Practices published in 2020 by Elsevier.

COURSE PLAN :

- Week 1:** Introduction to Plant Design (2); Introduction to Mass transfer Equipment (1); Phase Equilibrium (2)
- Week 2:** Distillation – Fractionation (4); Design Problem (1)
- Week 3:** Flash Distillation (1); Batch Distillation (3); Design Problem (1)
- Week 4:** Absorption (2); Adsorption (2); Design Problem (1)
- Week 5:** Liquid-Liquid Extraction - 3; Column Internals – 2 [Sieve (1), Valve (1)]
- Week 6:** Column Internals contd. - Bubble Cap (2); Packed column (1); Design Problem (2)
- Week 7:** Heat Exchanger: Introduction (1); Double Pipe HE (2); S&T HE (2)
- Week 8:** S&T HE contd. (1); Design Problem (1+2); Heat Exchanger Network (1)
- Week 9:** Heat Exchanger Network (3); Design Problem (2)
- Week 10:** Plant hydraulics: Pumps (2) Compressors(2), Pipeline (1)
- Week 11:** Pressure Vessels (2); Design Problem (2); Process Utilities (1)
- Week 12:** Safety (2), Process Design Package (3)