

Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	CHC301	Separation Processes	3	0	0	9

Course Objective

The objective of this course is to apply principles of mass transfer in designing of equipment used for separation processes.

Learning Outcomes

Upon successful completion of this course, student will:

- learn the concept of separation process and system
- have basic competence related to other courses involving separation processes.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Humidification: Introduction, psychometric charts, theory of adiabatic saturation and wet bulb temperature, dehumidification and water cooling, evaporative cooling, classification and design of cooling towers	08	Understanding the fundamentals of humidification and dehumidification. It will also help to student design precept of cooling towers
2	Liquid - Liquid Extraction: Introduction, ternary liquid equilibria, choice of solvent, single stage and multistage cross – current and counter – current operations, super critical fluid extraction, single stage, multistage and continuous contacting equipment	10	It will help students to understand liquid-liquid extraction unit operation. It will educate students about single and multi-stages extraction process
3	Leaching: Introduction and industrial applications, solid – liquid equilibrium, single stage and multistage cross – current and counter – current operations, equipment used in solid liquid extraction	06	It will educate students to understand solid-liquid extraction unit operation. It will educate students about single and multi-stages leaching process
4	Adsorption: Theory of adsorption, industrial adsorbents, adsorption equilibria, Freundlich and Langmuir equations, single and multistage operations, unsteady state adsorption, equipment for single stage and continuous contact, ion-exchange	06	It will teach students concept of adsorption unit operation. It will educate students about single and multi-stages adsorption process
5	Drying: Drying equilibria, drying rate curve, batch and continuous drying, time of drying calculations, mechanism of batch drying, equipment for batch and continuous drying operations	07	Understanding the drying process. It will teach students drying mechanism.

6	Crystallization: Crystals and crystal geometry, equilibrium solubility, supersaturation, factors governing nucleation and crystal growth rates, controlled rate of crystals, crystallization equipment	05	It will educate students to understand crystallization unit operation. It will also help students to learn about crystallization equipment.
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Textbooks:

1. Seader, J. D. and Henley, E. J. and Roper, D. K. (2010). Separation Process Principles, 3rd Ed., Wiley
2. Treybal, R.E. (1981). Mass Transfer operations, 3rd Ed. McGraw Hill Publication.

Reference Books:

1. Dutta, B. K. (2007). Principles of Mass Transfer and Separation Processes. Prentice Hall India.
2. Wankat, P. (1993). Equilibrium Stages Separations. Prentice Hall.