

Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	CHC207	Principles of Mass Transfer	3	1	0	11

Course Objective
The objective of this course is to develop the fundamental theoretical concepts of mass transfer operations that are essential for the designing of mass transfer equipment.
Learning Outcomes
<p>Upon successful completion of this course, student will:</p> <ul style="list-style-type: none"> <li>● learn the concept of mass transfer principles</li> <li>● have basic competence related to other courses involving separation systems and processes.</li> </ul>

Unit No.	Topics to be Covered	Class Hours	Learning Outcome
1	<b>Introduction to Mass Transfer Operations:</b> Introduction, choice of separation methods, fundamentals of diffusion: molecular diffusion in gases, liquids and solids, estimation of binary diffusion coefficients in gases, liquids and solids	5 L + 1 T	Understanding the fundamentals of mass transfer operations.
2	<b>Fick's law of Diffusion:</b> Concepts of mass/molar flux, and Fick's second law of diffusion, diffusive and convective flux, solution of mass transfer in homogeneous and heterogeneous systems	5 L + 2 T	It will help student to understand the fundamentals of diffusion and mass transfer rate.
3	<b>Mass Transfer Coefficients:</b> Concept of convective mass transfer coefficients, relations between mass transfer coefficients, theories of mass transfer, mass, heat and momentum transfer analogies	6 L + 2 T	It will provide the concept of mass transfer coefficient and relation with other transport phenomena.
4	<b>Interphase Mass Transfer:</b> Concept of equilibrium, diffusion between phases, two resistance theory concept of theoretical stage, material balances in steady state co current and counter-current stage processes	7 L + 2 T	It will provide the idea of interface mass transfer, and single and multistage mass transfer operations.
5	<b>Absorption:</b> Absorption equilibrium, choice of solvent, single component absorption material balances, counter current multistage operations, absorption in packed columns	7 L + 3 T	It will help students to understand absorption operation. It will also provide the detail understanding of tray and packed column.

6	<b>Distillation:</b> Binary vapor-liquid systems, phase diagrams, concept of relative volatility, flash vaporization, differential distillation, steam distillation, continuous multi-stage distillation, McCabe-Thiele graphical stage method, tray efficiencies, introduction to multi component distillation, azeotropic and extractive distillations	<b>12 L + 4 T</b>	It will provide the concept of distillation unit operation. It will also educate student about the calculation of number of stages required for desired mass transfer.
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**Textbooks:**

1. Treybal, R.E. (1981). Mass Transfer operations, 3<sup>rd</sup> 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.
3. Seader, J. D. and Henley, E. J. and Roper, D. K. (2010). Separation Process Principles, 3<sup>rd</sup> Ed., Wiley