

PCH225 PROCESS EQUIPMENT DESIGN

L	T	P	Cr
3	1	0	3.5

Course Objective:

To learn about the design procedures of process equipment used in chemical process plants.

Introduction: TEMA standards, Mass transfer equipment, Chemical reactor heating and cooling systems, General design procedures.

Heat Transfer Equipment: Shell and tube heat exchangers general design procedures, Fluid allocation, Baffles, LMTD and ϵ -NTU methods, Design calculations by Kerns' and Bell's methods, Condenser and re-boiler design, Plate type heat exchanger design, Fouling.

Mass Transfer Equipment: Process design calculations for binary and multi-component distillation, Fenske-Underwood-Gilliland Method, Selection of key components, Feed stage location, Types of plate contractors, Tray layout and hydraulic design, Packed towers and column internals, Types of packing, General pressure drop correlations, Column diameter and height.

Chemical Reactors: Types of heating and cooling methods, Design of helical coil system, Jacketed systems.

Software Tools: Application of software tools like ASPEN PLUS, COMSOL etc. for analysis of heat and mass transfer equipments and reactor systems.

Course learning outcomes (CLOs):

The students will be able to

1. design heat transfer equipment and mass transfer equipment
2. design cooling and heating systems of chemical reactors
3. use software tools for the analysis of process equipment

Reference Books:

1. Ray, S., and Gavin, T., *Coulson and Richardson's Chemical Engineering series Chemical Engineering Design, Volume 6* (2010).
2. Kern, D.Q., *Process Heat Transfer, International Student Edition, McGraw Hill* (2002).
3. Ludwig E.E., *Applied Process Design in Chemical and Petrochemical Plants Vol I, II, III, Gulf Publishing Co.* (1995).
4. Perry, R.H. and Green, D., *Chemical Engineer's Handbook, McGraw Hill, NewYork.* (2008).
5. Seader, J. D., and Henley, E. J., *Separation Process Principles, Wiley* (2001).

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessional (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25