

**ME497: DESIGN OF HEAT EXCHANGER**  
**CREDITS = 3 (L=3, T=0, P=0)**

**Course Objective:** To design heat exchanger for thermal engineering applications.

**Teaching and Assessment Scheme:**

Teaching Scheme			Credits	Assessment Scheme				Total Marks
L	T	P		Theory		Practical		
			ESE	CE	ESE	CE		
3	0	0	3	70	30	0	0	100

**Course Contents:**

Unit No.	Topics	Teaching Hours
1	<b><u>Different classification and basic design methodologies for heat exchanger:</u></b> Classification of heat exchanger, selection of heat exchanger, overall heat transfer coefficient, LMTD method for heat exchanger analysis for parallel, counter, multi-pass and cross flow heat exchanger, e-NTU method for heat exchanger analysis.	12
2	<b><u>Fouling and Design methodology:</u></b> Fouling, cleanliness factor, percent over surface, techniques to control fouling, additives, rating and sizing problems, heat exchanger design methodology.	06
3	<b><u>Design of double pipe heat exchangers:</u></b> Thermal and hydraulic design of inner tube and annulus, hairpin heat exchanger with bare and finned inner tube, total pressure drop.	06
4	<b><u>Design of Shell &amp; tube heat exchangers:</u></b> Basic components, basic design procedure of heat exchanger, TEMA code, J-factors, conventional design methods, Bell-Delaware method.	06
5	<b><u>Design of compact heat exchangers:</u></b> Heat transfer enhancement, plate fin heat exchanger, tube fin heat exchanger, heat transfer and pressure drop.	06
6	<b><u>Heat Transfer Enhancement and Performance Evaluation:</u></b> Enhancement of heat transfer, Performance evaluation of Heat Transfer Enhancement technique. Introduction to pinch analysis.	06
<b>TOTAL</b>		<b>42</b>

**List of References:**

1. *“Heat Exchanger Selection, Rating and Thermal Design”*, Sadik, Kakac, CRC Press
2. *“Fundamentals of Heat Exchanger Design”*, Ramesh K Shah, Wiley Publication
3. *“Compact Heat Exchangers”*, Kays, V.A. and London, A.L., McGraw Hill
4. *“Heat Exchanger Design Handbook”*, Kuppan, T, Macel Dekker, CRC Press
5. *“Heat Exchanger Design Hand Book”*, Schunder E.U., Hemisphere Pub.
6. *“Process Heat transfer”*, Donald Q Kern, McGraw Hill

**Course Outcomes (COs):**

After learning the course the students should be able to:

1. Outline common types of heat exchangers.
2. Analyze heat exchangers
3. Design double pipe heat exchangers
4. Design Shell & tube heat exchangers
5. Design of compact heat exchangers
6. Evaluate the performance of heat exchangers.