

Number of units 8	T 5	Pr 2	Th 3	Number of weekly hours	Annual System 30 weeks	Al-Esra'a University College Department: Engineering of Refrigeration and Air Conditioning Technologies
				Heat transfer	Third stage	
<u>Course Objective</u>						
To develop students' fundamental knowledge and insight into the physical principles and evolving technical capabilities of heat transfer principles including conduction, convection and radiation modes, Finned surfaces, heat exchangers, and applications in refrigeration and air conditioning field.						

Week	Topic	Lab. Experiment Assignments	Notes
1	Introduction, Basic Concepts of Heat Transfer, Heat Transfer Mechanisms.	Calculation of thermal conductivity	
2-3	Steady State One Dimensional Heat Conduction in a Large Plane Wall, and in a Cylinder.	Discussion	
4	Conduction through Multilayer Plane Wall, and Cylinder.	Calculation of heat transfer rate	
5	Over all Heat Transfer Coefficient.	Discussion	
6-7	Critical Radius of Insulation. Thermal Contact Resistance.	Calculation of thermal contact resistance	
8-9	The Fins	Heat transfer in very long straight fins	
10	Transient Heat Conduction, (Lumped System Analysis)	Discussion	
11	Two Dimensional Steady Heat Conduction	Steady two dimensional heat conduction in plate	
12	Introduction to Heat Transfer by Convection, Review to the Fluid Flow	Estimating the convection heat transfer coefficient in fins	
13	Non-Dimensional Group Numbers Analysis	Discussion	
14-15	Analytical Solution for Heat Convection Heat Transfer for Laminar And Turbulent Flow		
Half-year Break			
16	One Dimensional Steady State Force Convection Heat Transfer on Flat Plate		
17-18	Empirical Equations for Forced Convection Heat Transfer (Laminar and Turbulent Flow)	Forced convection from a cylinder in a cross flow	

19	Natural Convection Heat Transfer	Discussion	
20	Empirical Equations for Natural Convection Heat Transfer	Free convection from a cylinder in free flow	
21	Introduction to Heat Exchangers, Kinds of Heat Exchangers	Discussion	
22	The Overall Heat Transfer Coefficient, Fouling Factor	Parallel flow shell and tube heat exchanger performance	
23	The Log Mean Temperature Difference Method, The Effectiveness of the heat Exchangers	Discussion	
24-25	The Performances for Difference Kinds of the Heat Exchangers	Counter flow shell and tube heat exchanger performance	
26	Heat Radiation, Introduction, Basic Concepts	Discussion	
27	Characteristics of Radiation, The View Factor	Radiation Heat Transfer	
28	Radiation Heat Transfer Between Two Black Surfaces		
29	Radiation Heat Transfer Between Two Gray Surfaces		
30	Radiation Shields and The Radiation Effect		