Course short description:
Heat transfer methods, Conduction heat transfer in one dimension, conduction heat transfer in multidimensional steady flow, heat capacitance, Convection heat transfer, empirical and practical equation of convective heat transfer, Fundamental of radiation heat transfer.

Course general Aims:

1. To study the basics of heat transfer
2. To understand the basic modes of heat transfer that includes conduction, convection and radiation
3. To familiarize the students with some applications of heat transfer principles

1- ***Textbook:*** " J.P. Holman "Heat Transfer", McGraw Hill Publisher, tenth edition

References:

2- F. Kreith and W. Z. Black, Basic Heat transfer, Harper and Row publishers Co. (last edition)
3- F. Incropera, D. DeWitt, T.Bergman, and A. Lavine , Principles of heat and mass transfer, John Wiley and Sons. Seventh edition
4- Y. Cengel, and R.H. Turner. Fundamentals of Thermal-Fluid Science . McGraw Hill Publisher
5- M. Moran, H. Shapiro, B. Munson and D. DeWitt. Introduction to Thermal Systems Engineering Thermodynamic, Fluid Mechanics and Heat Transfer. John Wiley and Sons

Course contents:

Subject	Week.
1. Fundamental Concepts. Mechanisms of heat transfer, conduction, convection, and radiation heat transfer; thermal circuit, combined heat transfer mechanisms	1.5
2. The General conduction equation. Introduction. The general conduction on equation –Cartesian coordinates, polar cylindrical coordinates, spherical coordinates. The effect of variable thermal conductivity.	1.5
3 Steady state conduction in one dimension. Plane geometry systems, materials in series and in parallel, plane wall with heat generation, the overall heat transfer coefficient Polar cylindrical geometry systems, pipe and tube specification, materials in series. Cylinder with heat generation, the overall heat transfer coefficient, critical thickness of insulation	1
4.Heat transfer from extended surface	1
The general differential equation from extended surfaces , Analysis of straight fin of(rectangular, triangular and parabolic) profile, Circular fin of rectangular profile	
5. Steady state conduction in multiple dimensions Analytical method of solution, The conduction shape factor	1
6. Unsteady state heat conduction. Systems with negligible (internal and surface resistance), Systems with finite internal and surface resistance., Solution to multidimensional geometry systems	2.5
7. Radiation heat transfer. Introduction, Electromagnetic radiation spectrum, radiation laws, radiation heat transfer between surface, the view factor, methods for evaluating view factors.	1.5
8. Convection heat transfer. Introduction, dimensional analysis, natural convection systems, (on vertical surface – laminar flow on vertical surface transition and turbulence flow), Natural convection on a (Inclined flat plate, Horizontal flat surface, cylinder, and around spheres and blocks. Combined forced and natural convection systems	2.
9. Forced convection heat transfer Convection in a classed conduit, Convection in flows past immersed bodies	2
10. Revision	1

Evaluation

Mid-term Exam	40%
Homworks	10%
Final Exam	50%