

Lecture: Tu, Th, 3:30-5:00, 105 Northgate.

Discussion: W 2:00-2:59 PM, GSPP 150, F 12:00-12:59 PM, Etcheverry 3108

Instructor: Carlos Fernandez-Pello, 6105A Etcheverry Hall, Phone 642-6554
 Office hours: Tu, Th 11:00-12:30, 6105Etch. Hall and by appt.

Text: *Fundamental Heat and Mass Transfer*, Bergman, Lavine, Incropera & DeWitt,
 7th Ed., John Wiley

Problem Sets: Weekly, due on Thursday

Grading Policy: homework 20%, two mid-terms 40%, final exam 40%

Teaching Assistant: Zhenyuan Liu, at zhenyuan@berkeley.edu

Office hours: M 2:00-3:30 PM, W 3:00-4:30 PM, Hesse Hall GSI room

Week	Topics	Chapter & Section
1 (1/21)	1.1. INTRODUCTION: rates of energy transfer; modes of heat transfer; conservation of energy; units and dimensions	1.1-1.7
	1.2 CONDUCTION: rate equation; boundary and initial conditions; thermal properties	2.1-2.5
2 (1/28)	2.1 ONE-DIMENSIONAL, STEADY STATE CONDUCTION: plane wall, cylinder and sphere; composite walls; equivalent thermal circuits	3.1-3.4
	2.2 Conduction with internal heat generation	3.5
3 (2/4)	3.1 Extended surfaces (fins)	3.6
	3.2 Special cases	3.7-9
4 (2/11)	4.1 TWO-DIMENSIONAL, STEADY-STATE CONDUCTION Approaches	4.1-4.3
	4.2 Finite difference approach	4.4-4.6
5 (2/18)	5.1 TRANSIENT (UNSTEADY) CONDUCTION: Lumped capacitance	5.1-5.3
	FIRST MIDTERM on material 1.1-5.3	
6 (2/25)	6.1 Spatial effects: Plane wall; radial systems with convection; semi-infinite solids	5.4-5.7
	6.2 Multidimensional effects; finite difference approach	5.8-5.10

7 (3/4)	7.1 CONVECTION: Boundary layers; laminar and turbulent flow; convection transfer equations; approximations and special conditions	6.1-6.5
	7.2 Similarity; integral method; dimensionless parameters; analogies; turbulence	6.6-6.8
8 (3/11)	8.1 EXTERNAL FLOWS: Flat plate; cylinder; sphere	7.1-7.5
	8.2 Tube banks; packed beds	7.6-7.8
9 (3/18)	9.1 INTERNAL FLOWS: Hydrodynamic and thermal considerations; energy balance; correlations	8.1-8.9
10 (3/25)	SPRING RECESS	
11 (4/1)	11.1 FREE CONVECTION: Physical; phenomena; equations; similarity; laminar and turbulent flows; empirical correlations; free and enclosed flows	9.1-9.9
	SECOND MIDTERM on material 5.4-9.9	
12 (4/8)	12.1 RADIATION: Concepts; radiation intensity; blackbody radiation	12.1-12.3
13 (4/15)	13.1 Surface emission, absorption, reflection and transmission; Kirchhoff's law; gray surface; environmental radiation	12.4-12.9
14 (4/22)	14.1 RADIATION EXCHANGE BETWEEN SURFACES: View or shape factor; blackbody radiation exchange	13.1-13.2
	14.2 Radiation exchange between gray surfaces; other considerations	13.3
15 (4/29)	15.1 Multimode Heat Transfer (radiation + conduction + convection)	13.4
	15.2 Review	