Syllabus for
ME 433—Heat Transfer
3 Credit Hours
Spring 2003

I. COURSE DESCRIPTION

Problem-solving in the three modes of heat transfer—conduction, convection, and radiation—separately and in combinations. Additional topics include boiling, condensation, and heat exchanger design. Students conduct lab experiments and design of a heat exchanger. The computer is used for complicated heat transfer analyses.
Prerequisite: ME 331.
Course fee: $35.

II. COURSE GOALS

The student who successfully completes the course will gain an understanding of the mechanisms and modes of heat transfer and the methods of analysis and design of heat transfer equipment.

III. COURSE OBJECTIVES

As a result of successfully completing this course, the student will be able to do the following:

A. Demonstrate proficiency in the methods of analysis of one and two dimensional heat conduction in solids.

B. Analyze convection heat transfer systems in both free and forced convection.

C. Design a heat exchanger.

D. Analyze heat transfer by radiation using shape factors and networks.

IV. TEXTBOOKS

Required Textbook

Holman, J.P. Heat Transfer. New York: McGraw-Hill, 9th Edition 1997.

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

1. Attendance at each class or laboratory is mandatory at Oral Roberts University.
2. Double cuts will be assessed for absences immediately preceding or following holidays.
3. Excessive absences can reduce a student's grade or deny credit for the course.
4. Students taking a late exam because of an unauthorized absence will be charged a late exam fee.
5. Students and faculty at Oral Roberts University adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software.

6. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.

B Course Policies and Procedures

1. Evaluation Procedures
   Grading: Homework and Labs 20%, Examinations (3) 60%, Final Exam 20%
2. Homework and laboratory work is to be turned in at the beginning of class on the day it is due.
3. Late homework and laboratory work will not be accepted, but the three lowest scores will be dropped.

VI. COURSE CALENDAR

Session	Topic	Reading
1	Conduction & Thermal	1-1 to 1-2
2	Convection, Radiation, Dimensions	1-3 to 1-6
3	1-D Steady State Conduction – Planes	2-1 to 2-3
4	1-D Steady State Conduction – Cylinders & Spheres	2-4
5	1-D Steady State Overall HT Coefficient	2-5
6	1-D Steady State w/Heat Source & Systems	2-6 to 2-9
7	Lab #1	
8	Lab #2	
9	Transient Heat Flow	4-1 to 4-3
10	Convection Boundary Conditions	4-4
11	Multidimensional Systems	4-5
12	**Review Chapters 1, 2, & 4**	
13	**Exam I, Chapters 1, 2 & 4**	
14	Introduction – Convection	5-1 to 5-3
15	Laminar Boundary Layer – Plate	5-4
16	Energy Eg'n – Boundary Layer	5-5
17	Thermal Boundary Layer	5-6
18	Relation – Fluid Friction & Heat Transfer	5-7
19	Turbulent Boundary Layer	5-8 to 5-9
20	Heat Transfer in Tube Flow	5-10 to 5-11
21	Heat Transfer in High-Speed Flow	6-1 to 6-2
22	Empirical Relations for Pipe & Tube Flow	6-1 to 6-2
23	Flow Across Cylinders & Spheres	6-3
24	Tube Banks & Liquid Metal	6-4 to 6-6
25	**Review Chapters 5 & 6**	
26	**Exam II, Chapters 5 & 6**	
	Spring Break	

Session	Topic	Reading
27	Lab #3	
28	Lab #4	
29	Empirical Relations – Free Convection Plates, Planes & Cylinders	7-1 to 7-4
30	Free Convection Form Various Surfaces	7-5 to 7-11
31	Combined Free & Forced Convection	7-12 to 7-13
32	Important Concepts of Heat Exchangers	10-1 to 10-5
33	Analysis of Heat Exchanges	10-6 to 10-8
34	Heat Exchangers Design	10-9
35	Guest Speaker	
36	Radiant Heat Transfer Principles	8-1 to 8-3
37	Radiation Shape Factor	8-4
38	Condensation Heat Transfer	9-1 to 9-3
39	Film Inside Horizontal Tubes	9-4
40	Simplified Boiling Heat Transfer	9-6 to 9-8
41	**Review Chapters 7,8,9 & l0**	
42	**Exam III, Chapters 7, 8, 9 & 10**	
43	Semester Review of Heat Transfer Principles	
44	Review for Final	

Final Exam

Dr. John Matsson
Name of Instructor

ME 433
Course No.

Heat Transfer
Title of Course

Engineering and Physics
Name of Department

MISSION

The lifestyle at ORU is rooted in the word "Wholeness." ORU seeks to educate the whole person, with balanced emphasis placed on the development of mind, spirit, and body.

GENERAL OUTCOMES

1. Spiritual Development
2. Physical Development
3. Communication
4. Analysis
5. Problem Solving
6. Valuing in Decision-making
7. Social Interaction
8. Global Perspectives
9. Effective Citizenship
10. Aesthetic Responsiveness

MAJOR OUTCOMES

Analysis/Problem Solving: Has the ability to analyze, design, and obtain effective solutions to real world engineering and physics problems.

Communication/Team Work: Demonstrates ability to work on teams and communicate effectively in written and oral forms.

Fundamental Knowledge Base: Possesses fundamental knowledge of principles of engineering, physical sciences, and mathematics.

Christian Stewardship and Ethics: Ethically applies engineering technology to the solution of human problems using Christian principles.

COURSE GOALS

Ability to solve problems in the three modes of heat transfer: conduction, convection, and radiation.

Ability to analyze and design heat transfer equipment which use these three modes.

ASSESSMENT OF COURSE GOALS

STIMULI

Reading assignments
Assigned questions
Assigned problems
Design projects
Examinations
Laboratory work
Oral presentations
Discussion
Lecture

CRITERIA

Grades on exams
Attendance
FE Exam
Grades on homework
Grades on projects
Grades on labs