

MAE 3314 – HEAT TRANSFER Fall 2009 Syllabus

Instructor Hyejin Moon (hyejin.moon@uta.edu)
WH 306B, 817-272-2017
Office Hours: MW 9:00 – 10:30 am or by appointment

T A TBA

Class information:

- Room: Woolf Hall 221
- Time: T & Th 11:00 am – 12:20 pm
- Webpage: www-woolf.uta.edu (ID: TBA, PW: TBA)

Course Description:

The fundamental laws of heat and mass transfer, including steady and unsteady state conduction, convection, and radiation. Applications of heat transfer to thermal systems design are included. Prerequisites- MAE 3360, MAE 2314, MAE 3310.

Textbook:

Fundamentals of Heat and Mass Transfer, 6th edition by Incropera, DeWitt, Bergman, and Lavine (John Wiley & Sons, New York).

Student Learning Outcomes:

1. Ability to apply knowledge of mathematics, science and engineering to heat transfer
2. Ability to identify, formulate and solve heat transfer problems
3. Ability to design processes/systems involving heat transfer
4. Knowledge of techniques, skills and modern engineering tools for heat transfer applications

Key Assignments:

This course specifically assesses – (1) your ability to design a system, component, or process to meet desired needs (Program Outcome C), (2) your ability to identify, formulate, and solve engineering problems (Program Outcome E), (3) your ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (Program Outcome K). Therefore, certain related assignments are designated as Key Assignments in this course. ***In order to pass this course, students must submit and pass all key assignments. If any key assignment is not submitted and passed, the student will not pass the class even if he/she scores perfectly on all exams and other***

assignments. The assignments designated as Key Assignments are listed in the following “Course Requirement” section.

Exams & Grading:

- Homework (8 sets) $7 \times 3\% + 4\%$ (hw #8) = 25%
- Design Assignments (2 sets) $2 \times 5\% = 10\%$
- Exam 1 (11:00 am on 9/29/2009, 90 min) 20%
- Exam 2 (11:00 am on 11/5/2009, 90 min) 20%
- Final Exam (as scheduled) 25%

Letter grading will be based on the following scale:

A (above 90%), B (75 – 90%), C (60 – 75%), D (50 – 60%), and F (below 50%)

Course Requirements:

1. Attendance – Students are expected to attend all class sessions, complete reading assignments, and participate in class discussions. If a student misses a class, it is his/her responsibility to make up the missed class (i.e. get the course notes, assignments, and announcements from other students).
2. Homework and Design Assignments – Credit will be given only if the problems are turned in on time. Some suggestions on problem solving approach:
 - Present all work in a clear and neat manner.
 - Show all the steps in your analysis.
 - Check to see that the result is correct dimensionally (units).
 - Please underline or circle your final answers.
3. Key Assignments – In order to pass this course, you must pass all Key Assignments. If any Key Assignment is not passed, you will not pass the class even if you score perfectly on all exams and other assignments.
4. Exams – There will be two midterms and a final exam. There will be no make-up exam. You must take all tests at the scheduled time.
5. Academic honesty – It is the philosophy of the University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. (Regents’ Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.2.2).
6. Students with disability – If you need accommodations in compliance with the ADA, consult with the instructor.

Course Content and Schedule:

Week	Date	Subject	Textbook	Homework (due date)
1	8/25	Introduction to Conduction	1.1 – 2.5	
	8/27	Plane Wall	3.1 – 3.2	
2	9/1	Radial Systems	3.3	#1 (9/8)
	9/3	Conduction with Thermal Energy Generation	3.5	
3	9/8	Fins	3.6	
	9/10	Two-Dimensional Steady State Conduction	4.1 – 4.3	#2 (9/17)
4	9/15	Finite Difference Equation	4.4	
	9/17	Transient Conduction: Lumped Capacitance Method	5.1 – 5.3	
5	9/22	Transient Conduction: Spatial Effect	5.4 – 5.7	#3 Key Assignment (9/29)
	9/24	Transient Conduction: Boundary Conditions	5.8 – 5.9	
6	9/29	Exam #1		
	10/1	Introduction to Convection	6.1 – 6.3	Design #1 Key Assignment (10/15)
7	10/6	Convection Transfer Equation	6.4	
	10/8	Convection: continued	6.5 – 6.9	#4 (10/15)
8	10/13	External Flow: Laminar	7.1	
	10/15	External Flow: Turbulent	7.2 – 7.3	
9	10/20	Cross Flow	7.4 – 7.8	#5 (10/27)
	10/22	Internal Flow	8.1 – 8.3	
10	10/27	Convection Correlation	8.4 – 8.9	#6 (11/3)
	10/29	Free Convection	9.1 – 9.4	
11	11/3	Review session		
	11/5	Exam #2 (cumulative)		
12	11/10	Effect of Turbulence and Empirical Correlation	9.5 – 9.7	#7 (11/15)
	11/12	Introduction to Boiling	10.1 – 10.4	
13	11/17	Heat Exchangers	11	Design #2 Key Assignment (12/1)
	11/19	Introduction to Radiation	12.1 – 12.2	
14	11/24	Plank's Equation, Kirchhoff's Law	12.3 – 12.8	#8 (12/3)
	11/26	Thanksgiving Holiday		
15	12/1	Radiation Exchanges	13.1 – 13.4	
	12/3	Review session		
Final		Final Exam (cumulative)		