MECH 4315 Heat Transfer
Course Syllabus
Spring 2016

Time and Location: TR 1:30 am – 2:50 am, UGLC 342

Instructor: Dr. Evgeny Shafirovich
E-mail: eshafirovich2@utep.edu
Office hours: MTWR 09:00 am – 10:30 am
Office location: Engineering Bldg., A-112
Office phone: 747-6465

Textbook: Y.A. Çengel and A.G. Ghajar, *Heat and Mass Transfer: Fundamentals & Applications*, 5th Edition, McGraw-Hill, ISBN 978-0-07-339818-1

Blackboard: The instructor will use Blackboard for uploading lectures, updating the syllabus (if necessary), and communicating with students via "Announcements" and email.

Prerequisites: MECH 3312 *Thermodynamics* and MECH 3314 *Fluid Mechanics*

Course Objectives
The course covers the basic principles of heat transfer by conduction, convection, and radiation. After successful completion of this class, students will be able to:

- Understand the fundamentals of heat transfer processes occurring in natural and engineered systems.
- Use this understanding and analytical methods for solving engineering problems that involve heat transfer.
- Understand and use experimental techniques for heat transfer measurements.

Course Content

- Heat conduction equation
- Steady heat conduction
- Transient heat conduction
- Fundamentals of convection
- External forced convection
- Internal forced convection
- Natural convection
- Fundamentals of thermal radiation

Assignments
Homework assignments will include concept questions and problems. The solutions of assigned homework problems will not be collected and graded. However, if you do not make your homework assignments, you will not be able to pass the exams. If you have any difficulties in solving the assigned problems and need help, you are encouraged to contact the instructor.

Exams: There are three exams. All exams are open book and open notes. Makeup exams are not given.

Projects: Two projects will be assigned during the semester. The projects will consist of small design or experimental type problems.

Grading

Exam 1	20%
Exam 2	20%
Exam 3	20%
Project 1	20%
Project 2	20%

Scholastic Dishonesty: Solutions of the exams must represent the student's individual work. Scholastic dishonesty is the attempt of any student to present as his or her own work of another, or any work which he/she has not honestly performed, or attempting to pass any examination by improper means. ***Scholastic dishonesty is a serious offence and will not be tolerated.*** Suspected scholastic dishonesty will be handled according to the university policy.

Classroom Rules: Class participation and open discussions during lectures are encouraged. However, class disruptions such as ringing cell phones, arriving to class late, and leaving class early are not acceptable.

Reasonable Accommodation Policy: If you have a disability and need classroom accommodations, please contact the Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

ABET Program Outcomes Impacted: This class addresses the following ABET objectives:
(a) An ability to apply knowledge of mathematics, science, and engineering
(b) An ability to design and conduct experiments, as well as to analyze and interpret data
(c) An ability to design a realistic system, component, or process to meet desired needs
(e) An ability to identify, formulate, and solve engineering problems

COURSE CALENDAR ***May be updated throughout the semester. Always see the current version of the syllabus on Blackboard.***

Week	Day	Date	Lecture	Topic	Sections	Homework
1	T	1/19	1	Introduction and basic concepts	1-1, 1-2, 1-5 – 1-9, 1-11	C: 9-11, 47-49, 92, 93
	R	1/21	2	Heat conduction equation	2-1, 2-2	C: 10-14 P: 15, 16
2	T	1/26	3	Heat conduction equation	2-3	C: 20-21 P: 29-31
	R	1/28	4	Heat conduction equation	2-4	C: 35-40 P: 42, 49, 50, 52
3	T	2/2	5	Heat conduction equation **Assignment of project 1**	2-5, 2-6	C: 53-56, 79-82 P: 59, 70, 76, 85, 92
	R	2/4	6	Steady heat conduction	3-1	C: 5, 9-11 P: 17, 25, 30, 37

4	T	2/9	7	Steady heat conduction	3-2, 3-3	C: 43-48, 58-60 P: 50, 67
	R	2/11	8	Steady heat conduction	3-4, 3-5	C: 75, 96-100 P: 87, 95, 101, 102
5	T	2/16	9	Steady heat conduction	3-6	C: 105-117 P: 124, 127, 128
	R	2/18	10	Transient heat conduction	4-1	C: 1-11 P: 14, 23, 27
6	T	2/23	11	Transient heat conduction	4-2	C: 39-46 P: 58, 60, 76
	R	2/25	12	Transient heat conduction	4-3	C: 82-84 P: 85, 89
7	T	3/1		**Exam 1**	**Chs. 2 – 4**	
	R	3/3	13	Fundamentals of convection **Assignment of project 2**	6-1 – 6-5	C: 1-7, 30-35
		3/7 – 3/11		*Spring Break*		
8	T	3/15	14	External forced convection	7-1, 7-2	C: 1-13 P: 23, 42, 45
	R	3/17	15	External forced convection	7-3	C: 60-63 P: 70, 87, 95
9	T	3/22	16	Internal forced convection	8-1 – 8-3	C: 1-15 P: 19
	R	3/24	17	Internal forced convection	8-4	C: 16-18 P: 21, 27
10	T	3/29	18	Internal forced convection	8-5	C: 31-33, 35-37 P: 43, 57, 65
	R	3/31	19	Internal forced convection	8-6	C: 34 P: 36, 48, 53
11	T	4/5		**Exam 2** **Project 1 due**	**Chs. 6 – 8**	
	R	4/7	20	Natural convection.	9-1, 9-2	C: 1-8 P: 10, 11
12	T	4/12	21	Natural convection	9-3	C: 14-17 P: 40, 42, 48, 67
	R	4/14	22	Natural convection	9-5	C: 80-83 P: 87, 93, 96
13	T	4/19	23	Fundamentals of thermal radiation	12-1 – 12-3	C: 1-9, 18-21 P: 36, 38, 39
	R	4/21	24	Fundamentals of thermal radiation	12-5	C: 65-69 P: 77, 80, 84
14	M – R	4/25 – 28		**Defense of Project 2**		
15	M – W	5/2 – 4		**Defense of Project 2**		
	R	5/5		**Exam 3**	**Chs. 9 & 12**	

Note: There is no comprehensive Final Exam

Department of Mechanical Engineering Safety Statement

The Department of Mechanical Engineering at the University of Texas at El Paso is committed to a model of excellence in education that includes providing a safe and healthy environment for its students, staff, faculty and the general public.

Our goal is to maximize education and research training that can only occur if you, the individual, minimize hazards and risks. This can be done by:

- Providing adequate control of the health and safety risks arising from any and all activities;
- Consulting with employees on matters affecting their health and safety
- Providing and maintaining safe laboratories and equipment;
- Ensuring safe handling and use of substance;
- Ensuring all employees are competent to do their task and have adequate training; and
- Maintaining clean, safe and healthy working conditions

The principal investigator or individual in charge of each laboratory is ultimately responsible for safety in that respective lab. This includes training and ultimate release of the laboratory. Within the Department, we hold every employee (staff, faculty, student) responsible for implementing our safety practices and our departmental safety policy. We hold every employee (staff, faculty, student) responsible for providing leadership within our department to establish effective environmental safety and occupational health standards.