

Heat and Mass Transfer

ME309

Spring 2024

Instructor: Prof. Dr. Ali Koşar

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Class hours: Monday 11:40-13:30 Tuesday 13:40-14.30

Recitation: Tuesday 17:40-19:30

Online Office hours: Monday-Tuesday 13.30-14.30, Also feel free to send emails I could respond at my earliest convenience

Text: Introduction to Heat and Mass Transfer, Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incropera, David P. DeWitt, Seventh Edition and lecture notes.

Prerequisites: Junior Standing (Basic Fluid Mechanics knowledge would be helpful, but students without any thermal-fluid knowledge could still do well in this course with some additional effort).

Grading: Midterm 1 25%, Midterm 2 25%, Term Project 25%, Attendance 25% (based on exercises in recitations, hws and attendances in class).

Make up exams will be only offered when an official excuse document (such as medical report) is provided.

Attendance: It will be based on my personal impression, which will take your attendance to classes via zoom meetings, exercises in recitations, hws and class problems as well as my personal judgement into account.

Course Description: Heat and Mass Transfer is a vital subject for mechanical, chemical, production, aeronautical and metallurgical engineering disciplines. As a result of its multidisciplinary nature, it has many engineering applications. This course will introduce to students basic understanding of heat and mass transfer processes and their application to engineering problems.

The objectives of this course are: • To give fundamentals of heat and mass transfer • To give insight into the design of thermal-fluid systems • To help students to understand the physics behind heat and mass transfer

The following topics will be covered: 1- Introduction to Heat Transfer, 2- Conduction, 3- Mass Transfer, 4- Forced Convection, 5- Free Convection, 6- Boiling and Condensation, 7- Heat Exchangers, 8- Radiation.

Reference Books: • Heat and Mass Transfer: A Practical Approach, Yunus Çengel, 2006, ISBN-10: 007325035X • A Heat Transfer Textbook, 3rd edition John H. Lienhard IV, Professor, University of

Houston, John H. Lienhard V, Professor, Massachusetts Institute of Technology,
<http://web.mit.edu/lienhard/www/ahtt.html> • Fundamentals of Fluid Mechanics, Bruce R. Munson,
 Donald F. Young, Theodore H. Okiishi, Fifth Edition, 2006, ISBN-10: 047185526X • Basic Heat and Mass
 Transfer (2nd Edition), A.F. Mills, 1999, ISBN-10: 0130962473

Course Outline (Subject to change)

Week/ Dates Subjects Text Reference 2-4 Conduction Chs. 2-5+Lecture notes 5-6 Mass Transfer Ch.
 14+Lecture notes 6 Midterm Exam 1 7-8 External Flows Chs. 6-7+Lecture notes 9-10 Internal Flows Ch.
 8+Lecture notes 11 Free Convection Ch. 9+Lecture notes 12 Boiling and Condensation Ch. 10+Lecture
 notes 12 Midterm Exam 2 13 Heat Exchangers Ch. 11+Lecture notes 14 Radiation Chs. 12-13+Lecture
 notes

Week/ Dates	Subjects	Text Reference
1	Introduction	Ch. 1+ Lecture notes
2-4	Conduction	Chps. 2-5+Lecture notes
4	Exam 1 (Monday Class hours)	
5-6	External Flows	Chps. 6-7+Lecture notes
7-8	Internal Flows	Chp. 8+Lecture notes
9	Natural Convection	Chp. 9+ Lecture notes
10-11	Thermal Radiation	Chps. 12-13+ Lecture notes
12	Exam 2 (Monday Class hours)	
12	Boiling and Condensation	Chp. 10+ Lecture notes
13	Mass Transfer	Chp. 14+ Lecture notes

Co-operation on coursework:

It is encouraged to discuss with classmates, use texts, library materials, and other sources while doing any assignment. If a solution to a problem is found in the literature, students must provide correct citations to that literature.

For the assignments, every student is expected to have worked through his/her own analysis and to have written up his/her own work for submission. Under no circumstances is it permitted to present another student's work as one's own.

Cheating and plagiarism will not be tolerated. These activities will result in students receiving a failing grade in the course.