

## Syllabus

### MEMS 1052 – Heat and Mass Transfer

Spring Semester 2024

<b>Lecture Time:</b>	Mon. 08:50 – 11:00	<b>Classroom:</b>	4-203
<b>Instructor:</b>	Dr. John Pien	<b>Office:</b>	SCUPI Bldg. 503
<b>Office Hours:</b>	Mon. 11:10 – 11:55 Mon. 15:40 – 17:00 Tue. 10:15 – 11:00	<b>Email:</b>	john.pien@scupi.cn

**Teaching Assistant** Ruohan He    **Email** 2021141520047@stu.scu.edu.cn

#### Catalog Description

This course provides an in-depth treatment of the modes of heat transfer: conduction, convection, and radiation. Course topics include steady and unsteady-state conduction, heat sink applications, thermal resistance network, forced convection in internal and external flows, and the fundamental principles of radiation. The similarities between heat transfer and mass transfer are also introduced.

#### Textbook

Incropera, DeWitt, Bergman and Lavine, *Principles of Heat and Mass Transfer*, 1st Ed., Global Edition, SI Version, Wiley.

#### Course Objectives

Upon successful completion of this course, the students will be able to:

1. Provide an understanding and appreciation of the physical mechanisms of heat transfer.
2. Develop the ability to properly use the analytical and empirical descriptions of heat transfer mechanisms.
3. Use the knowledge of similarity relationship between heat transfer and mass transfer for simple geometrical objects to evaluate the results from mass diffusion.
4. Apply these descriptions to the analysis of thermal systems.

#### Prerequisites

ME0051 Introduction to Thermodynamics

#### Applicable ABET Outcomes

- An ability to apply knowledge of mathematics, science and engineering
- An ability to analyze and interpret data
- An ability to identify, formulate and solve engineering problems

- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

### Course Outline

1. Introduction
2. Introduction to conduction
3. 1D steady-state conduction
4. 2D steady-state conduction
5. Transient conduction
6. Introduction to convection
7. External flow
8. Internal flow
12. Introduction to radiation

### Course Grading

Homework	15%
Attendance/Quiz	15%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam	30%

### Exam Schedule

Midterm Exam I	Apr. 8 <sup>th</sup>
Midterm Exam II	May. 20 <sup>th</sup>
Final Exam	Jun. 17 <sup>th</sup>

### Late Assignment Policy

20% deduction/day.

### Evaluation Policy

Partial credit will be awarded to recognize that some portion of the work is correct. However, partial credit grading is only practical if the work is clearly developed, with clear and well-marked diagrams when fitting, with the appropriate equations prominently displayed, where the substitutions into the equations are quite clear, and the assumptions used are obvious to the grader. That is, it is the student's responsibility to present her/his work so clearly that the grader can quickly ascertain the location and nature of the error(s) and can follow the subsequent work through. If this is not clear on the work submitted, credit cannot be given (then or later). **Partial credit is assigned at the discretion of the grader.** It is therefore always in your best interest to practice clarity and completeness in your solutions when working homework problems. This is applicable to exam problems as well.

### Copyrights

The handouts used in this course are copyrighted. By "handouts" we mean all materials generated for this class, which include but are not limited to syllabi, in-class materials, videos, slides, and problem sets. Because these materials are copyrighted, you do not have the right to copy or distribute the handouts, unless the author expressly grants permission.

### **Academic Integrity**

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include but is not limited to the confiscation of the examination of any individual suspected of violating the University Policy.