MEMS 1052 Heat and Mass Transfer
Spring 2021

Course Coordinator: Professor Sam Ghalambor

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Office Hours: Mondays, 11:00(AM)-1:00(PM), or by appointment

Credits and Contact Hours (Lecture/Lab): 3 Credits, 3 Contact hours, Lecture

Designated as Required or Elective Course: Required

Course Description: This course provides an in-depth treatment of the modes of heat transfer; conduction, convection and radiation. Course topics include one-dimensional steady and unsteady-state conduction, heat sink applications, thermal resistance network, forced and free convection, heat exchangers and the fundamental principles of radiation.

Prerequisite and Co-requisite: MEMS 0051

Textbook: F.P. Incropera, D.P. DeWitt, Fundamentals of Heat and Mass Transfer, 8th Editions, Wiley and Sons.

Other Required Materials: None

Course Objective:

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. Apply these descriptions to the analysis of thermal systems.

Course Learning Outcomes/Expected Performance Criteria:

1. Basic concepts (70%)
2. Steady-state, 1-D heat conduction (70%)
3. Extended surfaces (70%)
4. Transient heat conduction (70%)
5. Forced convection (70%)
6. Free convection (70%)
7. Radiation Exchange Between Surfaces (70%)
8. Mass Transfer (70%)

Course Topics and lecture Hours Devoted to Each Topic:

1. Introduction to basic concepts
2. Fourier's Heat Conduction Law, concept of flux and relationship to momentum and mass transfer
3. Boundary Conditions
4. 1-Dimensional, steady-state heat conduction in Cartesian and Cylindrical Coordinates

5. Introduction to 2-dimensional, steady-state heat conduction
6. Extended surfaces
7. Transient heat conduction
8. Forced convection
9. Free convection
10. Radiation
11. Mass Transfer
12. Exams

Contribution of Course to Meeting the Requirements of criterion 5:

- Engineering Science: 2.5 credits
- Engineering Design: 0.50 credits
- College Level Mathematics: 0 credits
- Basic Science: 0 credits
- Realistic Constraints: economic, environmental and manufacturability
- Engineering Standards: TEMA

Mechanical Engineering Program Outcomes Addressed:

a. Math through differential equations and science are applied through the solution of homework problems and class examples.

Grading

The course grade will be determined based on the following contributions:

Midterm I	25%
Midterm II	25%
Final Exam	40%
Homework	10%

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact me or admin Staff for accommodation.

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.

Prepared by: Sam R. Ghalambor Date: January 10, 2018