

MAE 101C
Heat Transfer (4 units)

Class/Laboratory Schedule: four hours of lecture, eight hours of outside preparation.
12 hours/week total

Course Coordinator(s): Renkun Chen

Textbooks/Materials:

1. Basic Heat Transfer, A.F. Mills & C.F.M. Coimbra, (3rd Edition)

Catalog Description: Extension of fluid mechanics in MAE 101A–B to viscous, heat-conducting flows. Application of the energy conservation equation to heat transfer in ducts and external boundary layers. Heat conduction and radiation transfer. Heat transfer coefficients in forced and free convection. Design applications.

Prerequisites: MAE 101A-B, and MAE 105

Course Type: Required

Performance Criteria:

Objective 1

- 1.1 Students will demonstrate an understanding of conductive, convective and radiative heat transfer
- 1.2 Students will be able to recognize applications in which heat transfer is involved

Objective 2

- 2.1 Students will demonstrate the ability to analyze steady heat conduction
- 2.2 Students will demonstrate the ability to analyze transient heat conduction
- 2.3 Students will demonstrate the ability to calculate heat transfer by forced convection
- 2.4 Students will demonstrate the ability to calculate heat transfer by natural convection
- 2.5 Students will demonstrate the ability to calculate heat transfer by radiation

Objective 3

- 3.1 Students will demonstrate the ability to analyze heat exchangers
- 3.2 Students will be able to design heat exchangers for different applications

Course Objectives:**(Numbers in parenthesis refer to MAE Program Outcomes)**

1. To teach students the basic principles underlying heat transfer. (1, ME10)
2. To train students to identify, formulate and solve engineering problems in heat transfer. (1, ME10, AE12, AE13)
3. To introduce students to design concepts involving heat transfer. (1, 2, ME10, ME11)

Course Topics:

1. Introduction to concepts of heat transfer
2. Electrical analogies for conduction, convection and radiation
3. Steady heat conduction
4. Transient heat conduction
5. Fundamentals of convection
6. Natural convection
7. Internal forced convection
8. External forced convection
9. Heat exchangers
10. Radiation
11. Phase change in heat transfer

Last Updated: June 11 2019