1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

ME 306 HEAT TRANSFER I

2. Designation:

Required	☑	Elective	☐
Lower Division	☐	Upper Division	☑

3. Course Description: Fundamental principles of heat transfer; conduction, convection, and radiation; applications.

4. Prerequisites: CE/ME 303 (Fluid Mechanics) or ME 326A (Thermodynamics I), MATH 215 (Differential Equations)

5. Text and Materials: Heat Transfer, Eight Edition, J. P. Holman, McGraw-Hill, 1997

6. Course Objectives: The student will develop a fundamental understanding of the basic principles and equations of heat transfer, through studies of conduction and forced convection, design methodologies of fins and heat exchangers, and computational methods for solving hear transfer problems

Course Outcomes

- an understanding of the differences between conduction, convection, and radiation heat transfer modes.
- the ability set-up, analyze and solve one-dimensional heat transfer problems.
- an understanding of the numerical processes for solving heat transfer problems.
- the ability to design and analyze heat transfer augmented by fins.
- the ability to set-up, analyze and solve multi-dimensional steady state conduction problems
- the ability to set-up, analyze and solve unsteady heat transfer problems
- an understanding of the principles used to design heat exchangers
- the ability to set-up, analyze and solve radiation heat transfer problems

7. Topics Covered: (in Order of Presentation)

- Heat Transfer Modes: Conduction, Convection, and Radiation
- One-Dimensional, Steady state Conduction
- Numerical Methods for Thermal System Design
- Fin Design
- Multi-Dimensional Steady State Conduction
- Analysis of Unsteady Heat Transfer
- Design Relations for Forced-Convection
- Heat Exchanger Design
- Radiation Heat Transfer

8. Class Schedule:

Number of Sessions per week:	2
Duration of each session:	1 hour 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the 51 upper division units required for the mechanical engineering program.

Engineering Science	2 units
Engineering Design	2 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)

Skill outcomes:

- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (abet c)

Attitudes Outcome:

- an ability to think in a logical sequential process

11. Prepared by: Darrell Guillaume 01/2006