

Wichita State University
ME 522 HEAT TRANSFER
Fall 2000

Catalog Data: ME 522 Heat Transfer (3) Temperature fields and heat transfer by conduction, convection, and radiation. Steady and transient multidimensional conduction, free and forced convection and combined heat transfer. Discusses various analytical methods, analogies, numerical methods and approximate solutions. Prerequisite ME 521.

Text: Fundamentals of Heat and Mass Transfer by F.P.Incropera and D.P.DeWitt, McGraw-Hill, 4th Ed.

Instructor: Dr. T. S. Ravi; Rm: EB 101 Q, Ph: 978-6370; e-mail: ravi@me.twsu.edu

Help site: <http://156.26.32.36/fall2000.html>

Goals: The course will build on the knowledge developed in the basic thermodynamic course and Fluid Mechanics

- Introduce students to the fundamental principles governing the heat transfer phenomena.
- Derive necessary equations and boundary conditions related to different heat transfer processes.
- Study various methods to solve these equations.
- Develop skills to model heat transfer problems associated with many day-to-day and engineering applications.
- Introduce the concept of an open-ended problem and study its relevance to design problems.

Topics:

1. Introduction
 - Three modes of heat transfer
 - Definitions
2. Conduction Heat Transfer
 - One Dimensional Heat Transfer
 - Thermal Resistance circuits
3. Fin heat Transfer
 - Solution to fin equations
 - fin efficiency
 - fin effectiveness
4. Transient Conduction
 - Lumped Capacitance Method
 - Graphical Methods
5. Numerical Methods
 - Development of nodal equations
 - Gauss Seidel Iteration Method

6. Convection Heat Transfer

Free Convection

Forced Convection

Friction and Heat Transfer

Laminar and Turbulent Flow

Internal and External Flow

7. Radiation Heat Transfer

Definitions

Shape factors

black and gray surfaces

8. Combined Heat Transfer and Applications

Prerequisite by Topic:

Thermodynamics - ME 398; Fluid Mechanics - ME 521; Differential Eq. - Math 555

Homework:

Homework problems may be assigned in every class period. The students are expected to try and solve the problems on their own. The homework assignments are meant for practice. However, a major portion of the test will be based on the homework problems.

TESTS

Three 1 Hr Tests (25 x best 3 out of 4) = 75

Homework = 25

Grades: *A* > 90%; *B*=80-89%; *C*=60-79%; *D*; 60-69%; *F* < 59%

**** Last date to drop with a 'w' October 27, 2000**

TEST DATES: Sept. 25, Oct. 23, Nov. 13 Dec. 6, 2000.

All tests will be closed textbook and notes. You are allowed to bring an 'info. Sheet' (8 1/2" x 11"). No make up tests or exam will be given, except due to official travel (2 weeks advance notice needed) or hospitalization (Need to produce doctors certificate). The instructor at his discretion may assign student seating during exams.

Computer Usage: Use of computer software such as MATLAB, MATHCAD, and Spreadsheet is encouraged in solving problems, where appropriate.