Course: ME 32200 – Heat Transfer Laboratory

Type of Course: Required for ME program

Catalog Description: Introduction to heat transfer laboratory and design of experiments. Experiments on measurements of temperature and thermal conductivity, transient heat conduction, convection, radiation, boiling, and heat exchangers.

Credits: 1

Contact Hours: 3

Prerequisite Courses: ME 29300 and ME 32100

Corequisite Courses: ME 31900

Prerequisites by Topics: Measurement & Instrumentation Lab and Heat Transfer Course


Course Objectives: To introduce the students to heat transfer concepts in a laboratory, to provide students the opportunity to utilize data acquisition systems and computers, and to improve students’ written communication, teamwork, and experimental skills.

Course Outcomes: Students who successfully complete this course will have demonstrated an ability to:
1. Utilize data-acquisition software. (a, b)
2. Determine the thermal conductivity of a liquid or a gas and compare that value to published data. (a, b, k)
3. Model the transient temperature response of a lumped system and determine whether or not the model is valid. (a, b, k)
4. Predict the transient temperature response in a cylinder. (a, b, k)
5. Apply separation of variables to two-dimensional, steady-state heat conduction and to compare the analytical solution to finite difference and finite element solutions. (a, e, k)
6. Design and model a heat transfer device or system to meet a specific objective; then test and report results. (a, b, k)
7. Analyze heat exchanger performance. (a, b, k)
8. Solve a gray-surface enclosure problem. (a, k)
9. Communicate experimental results in written reports and oral presentation. (g)

**Laboratory Topics**

1. Introduction, report format, and uncertainty analysis
2. Oral reports on a heat transfer measurement device
3. Thermal conductivity lab
4. Lumped capacitance lab
5. Two-dimensional cylindrical, transient lab
6. Numerical experiment—two-dimensional heat conduction
7. Heat exchanger experiment
8. Design of heat transfer device and/or experiment including group presentations
9. Numerical experiment—radiant exchange between surfaces
10. Lecture over labs and introduction to data acquisition system

**Computer Usage**

Medium

**Laboratory Experience**

High

**Design Experience**

Medium

**Coordinator**

Donald Mueller, Ph.D., P.E.

**Date**

26 March 2011