

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
Textbook	H. I Abu-Mulaweh, <i>Heat Transfer Laboratory Manual</i> , current edition.
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	<p>Students who successfully complete this course will have demonstrated an ability to:</p> <ol style="list-style-type: none">1. Utilize data-acquisition software. (6)2. Determine the thermal conductivity of a liquid or a gas and compare that value to published data. (6)3. Model the transient temperature response of a lumped system and determine whether or not the model is valid. (1,6)4. Predict the transient temperature response in a cylinder. (1,6)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. (6)6. Design and model a heat transfer device or system to meet a specific objective; then test and report results. (6)7. Analyze heat exchanger performance. (6)8. Solve a gray-surface enclosure problem. (6)9. Communicate experimental results in written reports and oral presentation. (3)

Laboratory Topics	<ol style="list-style-type: none"> 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	27 June 2018