

MAE 107 FLUID THERMAL SCIENCE LABORATORY

(Required for ME; Elective for AE)

- Catalog Data:** **MAE107: Fluid Thermal Science Laboratory (Credit Units: 4) F.** Fluid and thermal engineering laboratory. Experimental analysis of fluid flow, heat transfer, and thermodynamic systems. Probability, statistics, and uncertainty analysis. Report writing is emphasized and a design project is required. Corequisite: MAE120. (Design units: 1)
- Textbook:** Holman, J.P. *Experimental Methods for Engineers*, 6th Edition, McGraw-Hill Inc., 1994.
Figliola, R.S. and Beasley, D.E. *Theory and Design for Mechanical Measurements*, 2nd Edition, John Wiley and Sons, 1995.
- References:** Students are to refer to books from courses MAE 91, MAE 130A/B and MAE 120. Students are encouraged to consult the UCI Library and the Web. Also see *Mechanical Engineers Handbook*, TJ151.M395 1998.
- Coordinator:** Yun Wang
- Course Outcomes:** Students will:
Apply theoretical concepts developed in course work of thermodynamics, fluid mechanics, and heat transfer with hands-on experiments.
Prepare a design project including economic analysis.
- Prerequisites By Topic:** Introduction to Thermodynamics
Viscous Incompressible Flow
- Lecture Topics:** Statistics
Central Plant (Lab at CP)
Mechanical Refrigeration
Ranque-Hilsch Vortex Tube
Otto Cycle
Wind Tunnel
Pipe Flow
Heat Transfer
Design Project
- Class Schedule:** Meets for 3 hours of lecture and 3 hours of lab each week for 10 weeks.
- Computer Usage:** Used for data collection (National Instruments), data analysis (Excel, Matlab, Mathcad), and report writing (Word, LaTeX).
- Laboratory Projects:** Statistics, Probability, Significant Figures, Graphs
UCI Central Plant
Vapor-Compression Refrigeration
Ranque-Hilsch Vortex Tube
Otto Cycle
Pipe Flow
Conduction in Spheres
Forced Convection

UCI Central Plant Energy Analysis
Design Project Review

Professional Component: Contributes toward the Mechanical Engineering Topics courses and Major design experience.

Relationship to Program Outcomes: This course relates to Program Outcomes a, b, c, e, and h; with additional Mechanical Engineering outcomes 3 as stated at:
<http://undergraduate.eng.uci.edu/degreeprograms/mechanical/mission>

Design Content Description

Approach: Students are given a capstone open-ended design problem including economic analysis. Students are encouraged to consider design alternatives and their costs. Design is emphasized in the laboratory experiments. Laboratory reports contain uncertainty analyses where appropriate.

Lectures: 50%

Laboratory Portion: 50%

Grading Criteria:

Reports:	70%
Quizzes:	15%
Lab Participation:	<u>15%</u>
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: ___ credit units or ___ %

Engineering Science: 3 credit units or 75 %

Engineering Design: 1 credit units or 25 %

Prepared by: Carl A. Friehe **Date:** July 2007

CEP Approved: Fall 2004