

ChE 4003 Chemical Engineering Lab I

Required course for ChE program

Catalog Description: Experimental verification of the principles of fluid flow, heat transfer, and engineering thermodynamics. Emphasis on laboratory safety, oral and written reports.

Prerequisites: ES 3003, ES 3073.

Corequisites: none

Prerequisites by Topic: Fluid mechanics, heat transfer, engineering thermodynamics

Recent Textbook: None

Other Required Material: None

Course Objectives: By the end of the semester, students will be able to:

1. Run an experiment correctly given equipment operating instructions
2. Relate a process flow diagram to the equipment
3. Analyze real world data including statistical analysis and experimental error.
4. Work effectively in a team
5. Apply the basic concepts of laboratory safety to experiments, including statistical risk analysis
6. Apply the theoretical principles learned in engineering science classes
7. Do basic experimental design
8. Present findings in written and oral formats

Major Topics Covered in the Course: Lab experiments cover heat transfer, fluid mechanics, and engineering thermodynamics; lectures cover laboratory safety, report writing, error analysis, and a review of engineering science principles associated with each experiment.

Class/Laboratory Schedule: Lecture meets for one 50-minute session each week for 14 weeks. Lab meets for one session that is up to 5 hours long each week for 14 weeks.

Professional Component Contribution: This course applies mathematics and basic chemistry and physics to engineering applications of thermodynamics, fluid mechanics, and heat transfer.

Relationship to Student Outcomes:

Relationship to Student Outcomes	
Criteria:	Description of related course content:
(a) an ability to apply knowledge of mathematics, science and engineering	Experiments in this course build on a background of chemistry, physics, thermodynamics, fluid mechanics, and heat transfer.
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	Students are required to conduct experiments and to analyze and interpret the resulting data.
(c) 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	

Relationship to Student Outcomes	
(d) an ability to function on multi-disciplinary teams	The experiments and reports are done in teams.
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	Professional behavior such arriving on time, wearing appropriate dress, and meeting deadlines is required. Ethical behavior is required in the course. Safety is emphasized in the course.
(g) an ability to communicate effectively	In addition to the communication skills required to function on a team, students are required to write twelve team reports on their experiments and present two team oral presentations.
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	Students are required to use computers to solve problems throughout the course. Excel and PlantScape (the Honeywell system) are required. Students also practice experimental techniques and data analysis.

Prepared by: Laura P. Ford (May 27, 2005)

April 26, 2007 Laura P. Ford, Minor wording changes were made to the objectives for PFDs and teamwork.

April 28, 2008 Laura P. Ford, Table "Relationship to Program Outcomes" added.

Course Objectives from Spring 2009 added by G. L. Price

Modified 3/20/2012 to remove old ChE criteria - GLP