

King Fahd University of Petroleum & Minerals
MECHANICAL ENGINEERING DEPARTMENT
ME 316: Thermo-Fluid Lab.

Catalogue Description: (0-3-1)

This lab course will deal with equal emphasis on fluid mechanics and heat transfer. All experiments conducted in this lab combine elements of theory and practice. Many of the concepts and basic theories which the student learns in the lectures of Fluid Mechanics and Heat Transfer courses are demonstrated and confirmed in the lab through different experiments.

Status in Curriculum (Required or Elective): Required (offered Fall & Spring)

Prerequisites: ME 311

Co-requisites: ME 315

Prerequisites by Topics:

- Friction losses, Pump performance, Pelton turbine (ME311)
- Compressor performance (ME203)
- Conduction, Convection and Radiation heat transfer (ME315)

Textbook: Lab Manual, Mechanical Engineering Department, KFUPM, Dhahran, Saudi Arabia.

References:

1. **Thermodynamics: An Engineering Approach**, Cengel, Y.A., and Boles, McGraw Hill.
2. **Engineering Fluid Mechanics**, C.T. Crowe, D.F. Elgar and J.A. Roberson.
3. **Fundamentals of Heat and Mass Transfer**, F. Incropera and D DeWitt, John Wiley.

Coordinator: Mr. Obaidallah Munteshari, Lecturer of Mechanical Engineering

Goals:(general objectives)

1. To provide students with hands-on experience for measuring various physical quantities and properties.
2. To enable students to apply the main concepts of Fluid Mechanics and Heat Transfer courses to evaluate the performance of physical systems.

Course Outline (Lecture Topics):

1. Fluid flow measurements (3 hours)
2. Friction losses in piping systems (3 hours)
3. Pump performance measurements (3 hours)
4. Compressible flow in a convergent-divergent nozzle (3 hours)
5. Centrifugal air compressor (3 hours)
6. Pelton impulse turbine (3 hours)
7. Temperature measurement and calibration (3 hours)
8. Conduction through copper bars (3 hours)
9. Unsteady heat transfer (3 hours)
10. Forced convection heat transfer (3 hours)
11. Double-pipe heat exchanger characteristics (3 hours)
12. Radiation heat transfer (3 hours)

Design Activities/Projects:

None.

Computer Usage:

Students are encouraged to solve some assigned homework problems using the available engineering software, such as EES.

Laboratory: Yes

Assessment Tools:

- i- Lab Test
- ii- Lab Reports
- iii- Class Work

Course Learning Outcomes:

- I- Be conversant with the concepts and definitions used in fluid mechanics and heat transfer courses.
- II- Understand and be able to apply fundamental concepts and equations to practical problems.
- III- Understand the operational principles of pumps, compressors and Pelton turbines.
- IV- Have a good understanding of Bernoulli's equation and its applications.
- V- Have a good understanding of the different forms of energy, its transfer and the laws that controls this transfer.

Course Learning Outcomes mapped to Student Outcomes:

Student Outcomes	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>
Course-to-Student outcome mapping	II	I III IV V					I II III IV V	III IV V			III IV V
Emphasis*	M	S					M	M			S

* L:: Little/None M: Moderate S: Strong

Status of Continuous Improvement review of this Course:

Date reviewed: -----

Reviewed by:

Prepared by: Mr. Obaidallah Munteshari

Date prepared: March 11, 2015