

1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

CE/ME303 FLUID MECHANICS I

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Fundamental principles and methods of fluid mechanics; thermodynamics of fluid flow; Newtonian fluids; equations of fluid flow; laminar and turbulent flow; applications.

4. Prerequisites: CE/ME 205 (Statics), PHYS 202 (General Physics II)

5. Text and Materials: Fluid Mechanis, Third Edition, Munson, Young & Okiishi, John Wiley & Sons, 2004.

6. Course Objectives: To introduce the fundamental principles of fluid mechanics, the basic equations governing of fluid statics and fluid flow, and the methods of solving engineering problems involving fluid mechanics.

Course Outcomes

- an ability to predict physical properties of Newtonian fluids and the standard atmosphere
- an ability to predict the pressures and forces exerted by a fluid at rest
- an ability to predict the flow rate and variations of pressure and velocity for ideal incompressible flows
- an ability to define a control volume and predict the forces and moments exerted by a moving fluid
- an ability to predict flow rate, head loss, pressure variation and power for viscous flows in pipes
- a knowledge of the methods of measuring fluid properties, pressure, velocity, flow rate and force

7. Topics Covered: (in Order of Presentation)

- Properties of Fluids – Ch. 1
- Static Pressure in Fluids – Ch. 2
- Pressure Measurement – Ch. 2
- Standard Atmosphere – Ch. 2
- Hydrostatic Forces on Plane Surface – Ch. 2
- Hydrostatic Forces on Curve Surface – Ch. 2
- Bouyancy & Stability – Ch. 2
- Bernoulli Equation – Ch. 3
- Applications of Bernoulli Equation – Ch. 3
- Control Volume Concept – Ch. 5
- Conservation of Mass – Ch. 5
- Conservation of Momentum – Ch. 5
- Conservation of Angular Mom – Ch. 5
- Applications to Turbomachines – Ch. 5
- Conservation of Energy – Ch. 5
- Laminar Flow in Pipes – Ch. 8
- Turbulent Flow in Pipes – Ch. 8
- Moody Chart & Curve-Fit Formulas – Ch. 8
- Minor Losses and Flow Meters – Ch. 8

8. Class Schedule: Number of Sessions per week: 2
Duration of each session: 1 hour 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the 51 units of upper division major requirements in the mechanical engineering program.
Engineering Science 4 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (abet h)
- a knowledge of how mechanical engineering integrates into inter-disciplinary systems

Skill outcomes:

- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

11. Prepared by: Chivey Wu

05/2005