EME3123 Fluid Mechanics
Course Description Sheet

Current Catalog Description:

Prerequisites: EGE3003, EME3013, EME3043. Fluid statics; conservation of mass, momentum, and energy; dimensional analysis and similitude; pipe flow; laminar and turbulent boundary layers; lift and drag on immersed bodies, potential flow, compressible flow. Lecture 3 hrs. 3 hours credit.

Current Text:

Gerhart, Gerhart, & Hochstein, *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics*, 8th Edition, 2016, John Wiley & Sons.

Computer Programs Utilized:

None Formally

Course Purpose:

Fluid Mechanics is a junior level course that covers the basic principles and applications of fluid statics and fluid dynamics. It is a required course for mechanical and architectural engineers since it studies commonly encountered concepts of fluid continuity, flow work, flow momentum, and energy interactions of fluid systems.

Course Objectives:

By the end of this course, the student will be able to:

- Define viscosity, Newtonian fluids, and general fluids terms (e.g., specific gravity.)
- Solve hydrostatic problems including manometers and flat and curved submerged surfaces.
- Utilize the Bernoulli Equation to solve inviscid flow problems.
- Utilize the Reynolds Transport Theorem to solve continuity, mechanical energy, and linear momentum problems.
- Identify the modes of fluid deformation and the assumptions for the Euler and Navier Stokes equations.
- Recognize differential analysis to verify incompressibility and irrotationality, and find acceleration, stream function, etc.
- Derive dimensionless groups and solve for similarity.
- Identify and determine estimates for losses in pipes.
- Predict flows, pressure drops, or diameters for single line and series piping systems for laminar and turbulent flows.
- Solve for lift and drag using experimental results and predict terminal velocity, etc.
- Solve for drag of composite bodies.
- Predict speed of sound for ideal gases.
- Solve basic isentropic 1-D compressible problems with and without area change.
- Solve basic normal shock problems.
- Demonstrate an elementary ability to solve an open-ended fluid mechanics design problem.