



**FACULTY:** ENVIRONMENTAL ENGINEERING AND ENERGY

**COURSE TITLE:** Fluid Mechanics

**Number of contact hours:** 45

**Duration:** 1 semester (fall / spring)

**ECTS credits:** 4

**Program description:** students understand the physical concepts, basic principles, and analysis methods of fluid mechanics. The objectives of this subject include the characterization of the fundamental properties of a fluid, a description of the principles of statics, hydrostatics. In addition, the course covers the analysis of ideal and real fluid flow, which include the basic laws governing fluid mechanics such as the momentum conservation principle, Bernoulli's Equation, analysis of the laminar flow through axisymmetric channels, and losses due to real fluid flow.

**Course type:** lectures (15), exercises (15), laboratory (15)

### Learning Objectives

- Understand and analyze the basic properties of fluids.
- Apply the principles of fluid statics and dynamics.
- Solve flow problems using conservation laws and Bernoulli's equation.
- Analyze pipe flow with pressure losses.

### Courses outline

- Introduction to Fluid Mechanics: Properties, density, viscosity.
- Fluid Statics: Pressure, hydrostatics, buoyancy.
- Fluid Dynamics: Continuity, momentum, and energy equations; Bernoulli's principle.
- Internal Flows: Laminar and turbulent flows in pipes, losses.
- Applications: Pumps, turbines, and fluid machinery.

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### **Teaching Methodology**

- Lectures: Core concepts and theoretical background.
- Tutorials: Problem-solving and practical applications.
- Laboratory: Hands-on experiments in fluid mechanics.

### **Literature:**

1. F. M. White, *Fluid mechanics*, New York: McGraw-Hill, 2008.
2. M. C. Potter, D. C. Wiggert i B. H. Ramadan, *Mechanics of Fluids*, Cengage: Cengage Learning, 2017.
3. Y. A. Çengel, J. M. Cimbala i R. H. Turner, *Fundamentals of thermo-fluid science*, McGraw-Hill Higher Education, 2012.
4. R. W. Fox, A. T. McDonald and J. W. Mitchell, *Fox and McDonald's Introduction to Fluid Mechanics*, 10th Edition, Wiley, 2020.

**Assessment method:** Theory and problem solving test in fluid mechanics, summary of the laboratory

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