ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA

DIM-GITI-223 Fluid Mechanics

SEMESTER: Spring

CREDITS: 6 ECTS (4 hrs. per week: 2 Theory + 1 Lab, on average)

LANGUAGE: Spanish

DEGREES: **GITI**

Course overview

In this course the main properties and the behavior of the fluids will be analyzed. This course covers hydrostatics, fluid dynamics, mass, energy and momentum principles, similitude, incompressible pipe flow and compressible flow. It includes laboratory exercises in flow measurement, pipe friction and hydraulic losses, CFD and shock waves.

Prerequisites

- Basic knowledge of Mechanics, Physics and Calculus.

Course contents

Theory:

1. Introduction to fluid mechanics: properties.
2. Hydrostatics.
3. Fluid dynamics I: Integral Relations for a Control Volume.
4. Fluid dynamics II: Differential Relations for a Fluid Particle.
5. Dimensional Analysis and Similarity.
6. Viscous Flow in Ducts.
7. Flow Past Immersed Bodies.
8. Compressible Flow.

Laboratory:

There will be four 2-hour sessions in the last weeks.

P1. CFD: Simulation of laminar and turbulent pipe flows.
P2. EPANET: piping systems
P3. Hydrodynamics I: Bernoulli equation, flow measurement, Osborne Reynolds experiment.
P4. Hydrodynamics II: Friction and minor losses, shock waves.

Textbook

- White, F. M. Fluid Mechcanics. (8th edition). McGraw Hill. Madrid 2015.

Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the final exam of 3.5 over 10.

The overall grade is obtained as follows:

- Exams:
  - Exams (mid-term and final): 45%
  - Tests: 30%
- Laboratory: Reports (20%), Performance during the lab sessions (5%).
- They are weighted: 75% (Exams) and 25% (laboratory) if both parts are ≥ 5.