

## 29716 - Fluid Mechanics

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 29716 - Fluid Mechanics

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 330 - Complementos de formación Máster/Doctorado  
434 - Bachelor's Degree in Mechanical Engineering

**ECTS:** 6.0

**Year:** 434 - Bachelor's Degree in Mechanical Engineering: 2

330 - Complementos de formación Máster/Doctorado: XX

**Semester:** Second semester

**Subject type:** 434 - Compulsory

330 - ENG/Complementos de Formación

**Module:**

### 1. General information

The course, which is part of the industrial training block of the undergraduate curriculum, presents the conceptual bases of Fluid Mechanics along with some of its basic applications. It is one of the fundamental subjects of Mechanical Engineering, and its contents will be required in several compulsory and elective subjects of the Degree.

Previous knowledge of Physics and Mathematics is necessary to understand the subject. In particular, it is important the basic knowledge of: vector and matrix calculus, origin and meaning of forces and moments, differential and integral calculus in several variables and differential and integral equations.

### 2. Learning results

To describe a flow by means of its characteristic lines, and to understand the relationship between the different fluid quantities.

To know the conservation equations and interpret their physical meaning.

To know how to balance mass, forces, linear momentum, angular momentum and energy.

Employ dimensional analysis techniques to design experiments and order of magnitude analysis to simplify problems.

To know the general characteristics of the main flows of interest in Engineering such as viscous dominant flow, duct flow, channel flow and external/boundary layer.

To know the principles of operation of the basic instruments to measure pressure, density, velocity and viscosity in fluid installations.

### 3. Syllabus

Unit 1: Concept of fluid. Physical properties of fluids.

Unit 2: Kinematics.

Unit 3: Fluidostatics.

Unit 4: Fundamental equations of Fluid Mechanics.

Unit 5: Dimensional analysis and similarity.

Unit 6: Unidirectional viscous flow.

Unit 7: Pressurized flow in ducts.

Unit 8: Flows with free surface.

Unit 9: External flow. Boundary layer. Resistance and Sustainment

### 4. Academic activities

1. Lectures and problems. They will be developed at a rate of three hours per week, two hours of theory and one of problems/cases, plus one hour of problems every two weeks

2. Laboratory practices. 10 Hours distributed into five sessions. The practices are carried out in small groups.

3. Assignments, consisting of problem solving, case studies or numerical computational simulations.

4. Study and personal work. In this part of the subject, each student must dedicate at least 80 hours, necessary for the study of theory and problem solving.

5. Assessment tests. Six hours, approximately

## **5. Assessment system**

The assessment system for this subject is, as a general rule, a global assessment with a final exam. There is also the possibility of continuous assessment by means of passing a control or partial exam in the middle of the term, and another control with the rest of the subject that is carried out in June.

Final grade of the subject

1. The grade for assignments (10%) Voluntary assignments are proposed at the beginning of the subject, which are carried out in very small groups, on specific topics of application of the subject.

2. The grade for theory, problems and practicals (90%-100%). The contents of the subject (theory, problems and practicals) are divided into two parts. In the middle of the four-month period, a control corresponding to the first part is carried out. If this control is passed, only the second part has to be examined in the final exam in June.

The grade for theory, problems and practicals is 90% of the overall grade if work has been done, or 100% if it has not been done.

In order to pass the subject, an overall grade equal to or higher than 5 points out of 10 is required.

No grades for mid-term exams or assignments are kept between exam sessions

## **6. Sustainable Development Goals**

6 - Clean Water and Sanitation

7 - Affordable and Clean Energy

9 - Industry, Innovation and Infrastructure