Universidad Zaragoza

Academic Year/course: 2023/24

29917 - Fluid Mechanics

Syllabus Information

Academic year: 2023/24
Subject: 29917 - Fluid Mechanics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 435 - Bachelor's Degree in Chemical Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

The goal of the Fluid Mechanics subject, located in the first four-month period of the second year of the degree term, is to provide the graduate in chemical engineering with the knowledge and skills related to the fundamentals of fluid mechanics at the service of engineering. Given its generalist nature, the program is broad and mainly addresses basic aspects that will provide the student with solid foundations and technical-scientific rigor.

These approaches and goals are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/), specifically, the learning activities planned in this subject will contribute to the achievement of objective 6.4, objective 8.2, objective 9.5 and objective 11.5

2. Learning results

- Know how to describe a flow by means of its characteristic lines.
- Interpret the physical meaning of conservation equations.
- Know how to balance mass, forces, angular momentum and energy over control volumes.
- Employ dimensional analysis techniques to design experiments and order of magnitude analysis to simplify problems.
- Know the characteristics of the main flows of interest in engineering (external aerodynamics, duct flow, boundary layer flow, thin film flow).
- Know the working principles and operation of basic instruments for measuring pressure, flow, velocity and viscosity.

3. Syllabus

1. Introduction
2. Kinematics
3. Fluidostatics
4. Conservation integral equations
5. Dimensional analysis and similarity
6. Equation dimensioning
7. Unidirectional flows of viscous fluids
8. Ideal fluid flow
9. Boundary layer
10. Flow in open channels
11. Lubrication

4. Academic activities

In the classroom

(1) Theory: questions on videos or pdfs (8 h)

(2) Problems: Students will go to the blackboard to do a problem (42 h)

Laboratory practices

Several small groups will be formed in each session (10 h)

Personal work of the student

(1) Theory: review a video or pdf.

(2) Problems: watch videos of solved problems and do proposed problems.

Multidisciplinary project (8 h)

In order to promote communication and autonomous learning, group work will be developed that may involve other subjects of the same term. In this work the "Problem Based Learning" methodology will be used.

5. Assessment system

Option 1 (Continuous assessment)

To pass, it is mandatory:

- Attend the eight unforgivable knowledge problem solving class.
- Pass the eight problems handed in during the term.
- Attend all laboratory practices.

Calculation of the average: 10% laboratory + 45% problems + 10% theory + 20% "Problem Based Learning" work (PBL) (during the whole term) + 15% real problems (last week of class). If PBL is not possible, would be divided equally between problems and theory.

Students who fail a problem in the continuous assessment may recover it in the global test (option 2).

Option 2 (Global assessment):

Those students who do not wish to follow the continuous assessment may choose to take the test at (100% of the final grade). This test will have the eight unforgivable knowledge problems plus a few questions from lab.