GENERAL INFORMATION

Data of the subject	
Subject name	Fluid Mechanics
Subject code	DIM-GITI-223
Mainprogram	Bachelor's Degree in Engineering for Industrial Technologies
Involved programs	Grado en Ingeniería en Tecnologías Industriales y Grado en Administración y Dirección de Empresas [Second year] Grado en Ingeniería en Tecnologías Industriales [Second year]
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Department of Mechanical Engineering

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DESCRIPTION OF THE SUBJECT

Contextualization of the subject
Prerequisites

There are no prerequisites. However, the course relies on concepts seen in previous courses:

- Mechanics
- Physics
- Calculus
- Thermodynamics
- Differential equations

Course contents

Contents
1. **Introduction to Fluid Mechanics.** Concept of a Fluid. Properties of a fluid. Viscosity. Surface Tension.
2. **Hydrostatics.** Pressure Distribution in a Fluid. Pressure measurement. Plane and curved surfaces. Buoyancy and Stability.
3. **Fluid dynamics I: Integral Relations for a Control Volume.** The Reynolds Transport Theorem. Conservation of Mass. The Linear Momentum Equation. The Angular-Momentum Theorem. The Energy Equation. The Bernoulli's Equation.
4. F**luid dynamics II: Differential Relations for a Fluid Particle.** The Acceleration Field of a Fluid. The Differential Equations of Mass Conservation, Linear and Angular Momentum and Energy. Vorticity and Irrotationality.
5. **Dimensional Analysis and Similarity.** The Pi Theorem. Similitude.
6. **Viscous Flow in Ducts.** Reynolds-Number Regimes. Flow in circular and non-circular pipes. Losses.
7. **Flow Past Immersed Bodies.** Reynolds-Number and Geometry Effects. The Boundary-Layer Equations. Boundary Layers with Pressure Gradient. Experimental External Flows.
8. **Compressible Flow.** The Speed of Sound. Isentropic Flow with Area Changes. Shock Waves.

EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight
Final Exam	Understanding of basic concepts Solving practical problems Analysis of results Presentation and written communication	60
Quizz and Mid-term Exam	Understanding of basic concepts Solving practical problems Analysis of results Presentation and written communication	20
Lab reports and lab work	Understanding of basic concepts. Solving practical problems Realization of laboratory practices Presentation and written communication. Collaboration skills Active participation	20

Grading

Ordinary Call:

Part I. Exams (80%):

- 5Quizz. Chapters 1 and 2.
- 15% Mid-term Exam: Quiz (35%) and Problem(s) (65%). Chapters 1, 2, 3 and 4.

Part II. Laboratory (20%).

- 15% Laboratory reports.
- 5% Actiparticipationtion in the laboratory sessions.

Extraordinary call:

The complete Part I and/or Part II will be examined if failed in the Ordinary Call. In case one Part is passed in the Ordinary Call, its grade will be maintained. The grade is evaluated as:

- 80% Extraordinary exam
- 20% Laboratory exam

In both Calls, the weighted average will be calculated only when the grades in Parts I and II are equal to or higher than 5. The use of programmable calculators is not allowed in the exams, nor is the use of formula sheets, books or notes. The Mid-term, Final and Extraordinary exams will consist of a Quiz (35%) and Problems (35%).

Failure to attend more than 15% of the classroom hours of this subject may result in the impossibility to attend the ordinary and extraordinary exams.

WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Reading and study of the theoretical contents explained in class	After each class	
Complement the study of the slides with the rest of the course materials	After each class	
Attempt to solve the problems to be performed in class.	Before each class	
Review and study of the problems solved in class.	After each class	
Attempt to solve problems not done in class, as well as exam problems. Verification of the solution published in Moodle and request for tutoring if necessary.	After every chapter	
Preparation of the exams.	After chapters 2, 4 and 8	

Laboratory reports	During the last 5 weeks	

BIBLIOGRAPHY AND RESOURCES

Basic References
- Çengel, Y. A., Cimbala, J. M., Fluid Mechanics: Fundamentals and Applications (4th edition). McGraw Hill.   - White, F. M. Fluid Mechanics. (8th Edition). McGraw Hill.   - Slides and videos of each topic (available in Moodle).   - Questionnaries (available in Moodle).   - Solved problems and videos of the resolution of some of them (available in Moodle).   - Solved exams and videos of the resolution of some of them (available in Moodle).