Engineering fluid mechanics

Academic Year: (2022 / 2023) **Review date: 13/09/2022 10:23:55**

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: MORENO BOZA, DANIEL

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Calculus I, II
Physics I, II
Linear Algebra
Writing and Communication Skills
Programming
Thermal Engineering
Machine Mechanics

OBJECTIVES

By the end of this content area, students will be able to have:
1. knowledge and understanding of fluid mechanics fundamentals
2. awareness of the wider multidisciplinary context of engineering.
3. the ability to apply their knowledge and understanding to identify, formulate and solve problems of fluid mechanic using established methods;
4. the ability to design and conduct appropriate experiments, interpret the data and draw conclusions;
5. workshop and laboratory skills.
6. the ability to select and use appropriate equipment, tools and methods;
7. the ability to combine theory and practice to solve engineering problems of fluid mechanics;
8. an understanding of applicable techniques and methods in fluid mechanics, and of their limitations;

DESCRIPTION OF CONTENTS: PROGRAMME

Introductory course on Fluid Mechancis composed of:

1. Introduction to Fluid Mechanics: continuum hypothesis, local thermodynamic equilibrium, equations of state and definition of fluid variables.
2. Flow kinematics: Lagrangian and Eulerian description, convective flux, and Reynolds transport theorem.
3. Conservation laws: integral and differential forms of the continuity, momentum, and energy equations.
4. Dimensional analysis: Pi theorem and physical similarity.
5. 1D Flow: Couette, Poiseuille, and other flows of practical interest.
6. Flow in pipes: major and minor losses.
7. Introduction to external flows.

LEARNING ACTIVITIES AND METHODOLOGY

Teaching methodology will incluye:
1. Lectures: The students will be provided with lecture notes and recommended bibliography.
2. Problem solving sessions, related with the course topics
3. Homework problems aiming at student self-evaluation.

4. Development and interactive presentation of guided works, including four lab session as direct application of theory.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

The continuous evaluation will be based on:
- Midterms: a total of 2 midterms during the course.
- Lab sessions: 4 laboratory sessions; reports are due one week after each session.

All students must do the final exam. The final grade will be the sum of 40% continuous assessment and 60% of the grade of the final exam.

In the extraordinary examination, the final grade will be either the sum of 40% continuous assessment and 60% of the grade of the final extraordinary exam or 100% of the grade of the final extraordinary exam, whatever is higher.

BASIC BIBLIOGRAPHY

- Antonio Crespo Martínez Mecánica de Fluidos, Thomson.

- Frank M. White Fluid Mechanics, McGraw Hill.

- MARCOS VERA COELLO, CARLOS MARTÍNEZ BAZÁN, ANTONIO L. SÁNCHEZ PÉREZ, IMMACULADA IGLESIAS ESTRADÉ Ingenieria Fluidomecanica, Paraninfo, 2012

ADDITIONAL BIBLIOGRAPHY

- A. L. Sánchez Apuntes de Procesos Fluidotérmicos, Publicaciones de la Universidad Carlos III de Madrid., 2005

- Amable Liñán Martínez Apuntes de Mecánica de Fluidos, Publicaciones de la ETSI Aeronáuticos de Madrid, 2006