66422 - Instrumentation and Simulation of Fluid Systems

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	536 - Master's in Mechanical Engineering
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

- Lectures, where the teacher explains the course contents.
- Lab and computer practice sessions. They are highly advisable to follow in order to better understand the course because they help illustrate and deepen in the methodologies presented during the lectures, both computational and

experimental.
- Tutorials. The teacher solves doubts during office hours.

5.2.Learning tasks

The course includes the following learning tasks:

- **Lectures** (40 hours). Three hours per week, up to complete 40 hours in one semester, which is considered appropriate to complete the syllabus.
- **Laboratory sessions** (20 hours). Every student has to carry out 10 sessions, two hours each. In each session students will form groups of two or three people.
- **Autonomous work** (90 hours). A minimum of 90 hours is required to get acquainted with the course theory and fill in the lab tables and reports.
- **Tutorials**. The teacher's office hours will be communicate for student to ask doubts.

5.3.Syllabus

The course will address the following topics:

Section I. Fluid flow instrumentation

1. Introduction to measuring systems. Errors and calibration.
2. Measurement of fluid flow magnitudes (pressure, temperature, flowrate, etc.)
3. Signal transmission and conditioning: data gathering and processing.

Section II. Fluid flow computational simulation

1. Methods and applications of Computational Fluid Dynamics
2. Discretization and computational solution of fluid flow equations
3. Benchmark cases simulation and results assessment

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class.

5.5.Bibliography and recommended resources

Recommended books:

Cheremisinoff, Nicholas P.. Applied fluid flow measurement : fundamentals and technology / Nicholas P. Cheremisinoff New York ; Basel : Marcel Dekker, cop. 1979

Ferziger, Joel H.. Computational methods for fluid dynamics / Joel H. Ferziger, Milovan Peric . - 3rd rev. ed. Berlin : Springer, cop. 2002

Gupta, S. V.. Measurement uncertainties : physical parameters and calibration of instruments / S. V. Gupta New York : Springer, cop. 2012

Patankar, Suhas V.. Numerical heat transfer and fluid flow / Suhas V. Patankar New York : Hemisphere, cop. 1980

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Rathakrishnan, E.. Instrumentation, measurements, and experiments in fluids / E. Rathakrishnan Boca Raton [Florida] : CRC, cop. 2007