66422 - Instrumentation and Simulation of Fluid Systems

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	536 - Master's in Mechanical Engineering
ECTS	6.0
Course	1
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process for this subject has been devised based on the following:

Lectures given to all students, where the teacher explains the subject.

Lab and computer hands-on practices. They are highly advisable to follow in order to better comprehend the subject as they are devised to illustrate and deepen in the metodologies presented in the lectures, both computational and experimental.

Doubt-solving in teacher's office.

5.2.Learning activities

The scheduled activities offered to the student to help him/her reach the results forecast encompasses the following activities.

Lectures. Three hours per week, up to complete 40 hours in one semester, which is considered appropriate to complete the syllabus.

Lab hands-on work. Every student has to carry out 10 sessions, two hours each. In each session groups of two or three people will be formed.

Personal study. In this part a minimum of 90 hours is deemed to be required to get acquainted with the theory of the subject and fill in the lab work tables and reports.

Doubt-solving scheduled timetable will be published along the semester.

The lectures and the lab sessions will be imparted according to the timetable set up by the Centre

5.3.Program

Part I. Fluid flow instrumentation

- Introduction to measuring systems. Errors and calibration.

- Measurement of fluid flow magnitudes (pressure, temperature, flowrate, etc..)

- Signal transmision and conditioning: data acquisition and processing.

Part II. Fluid flow computational simulation

- Methods and applications of Computational Fluid Dynamics

- Discretization and computational solution of fluid flow equations

- Benchmark cases simulation and results assessment.

5.4.Planning and scheduling

From the start of the semester students will have access to the detailed schedule of lectures and deliverables that will be provided by the teachers who impart the subject.

5.5.Bibliography and recomended resources

Books recommended are

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

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