

Academic Year: (2022 / 2023)

Review date: 20/05/2022 14:28:28

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: RUBIO RUBIO, MARIANO

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Engineering Fluid Mechanics or similar (Bachelor)
Advanced Fluid Mechanics (1st term)

OBJECTIVES

Competencies and learning results acquired by the student:

- Knowledge of a repertoire of experimental techniques, commonly used in Fluid Mechanics, as well as their physical and mathematical basis. This knowledge must enable the student to choose the most adequate technique for a particular problem.
- A critical attitude towards the interpretation of experimental results, either obtained by him/herself or found in the literature.

DESCRIPTION OF CONTENTS: PROGRAMME

- Fluid properties measurements
- Flow meters and pitot tubes
- Thermal anemometry (Hot wire)
- Laser Doppler Anemometry (LDA/LDV)
- Introduction to signal analysis
- Interferometric techniques (Schlieren, Shadowgraphy)
- Laser Induced Fluorescence (LIF)
- Particle Image Velocimetry (PIV)

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures where the techniques are described
- Software-based (Matlab) lectures for signal and image analysis
- Practical sessions where different techniques will be used to characterize some relevant flows

The students will have to deliver reports based on the measurements concerning three of the explained techniques.

For instance:

- + Viscosity measurement through image analysis
- + Hot wire
- + Laser Doppler Anemometry

ASSESSMENT SYSTEM

% end-of-term-examination/test:	0
% of continuous assessment (assignments, laboratory, practicals...):	100
- Scientific-technical reports on the lab techniques 90%:	
+ Viscosity measurement through image analysis 20%	
+ Thermal anemometry 35%	
+ Third technique lab 35 %	
- Continuous assessment of the students progress 10%	
+ Kahhot!-wise game-quizzes	

BASIC BIBLIOGRAPHY

- Cameron Tropea (Ed.) Handbook of experimental fluid mechanics, Springer, 2007
- H.H. Bruun Hot-wire anemometry, Oxford Science Publications, 1995
- John G. Webster Measurement, instrumentation and sensors handbook, CRC Press, 1999
- Markus Raffel Particle image velocimetry : a practical guide, Springer, 2007
- Richard J. Goldstein Fluid Mechanics Measurements, Taylor & Francis, 1996

BASIC ELECTRONIC RESOURCES

- Finn E. Jørgensen, DANTEC DYNAMICS . How to measure turbulence with hot wire anemometers:
<http://web.iitd.ac.in/~pmvs/courses/mel705/hotwire2.pdf>