

Experimental Aerodynamics

Academic Year: (2023 / 2024)

Review date: 28/04/2023 17:46:13

Department assigned to the subject: Aerospace Engineering Department

Coordinating teacher: DISCETTI , STEFANO

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Students are expected to have a basic knowledge of aerodynamics and fluid mechanics.

OBJECTIVES

The main objective of the Experimental Aerodynamics course is to develop the ability to design and perform experimental campaigns and analyze experimental data. The knowledge includes the design of experiments, the facilities for aerodynamic tests, the different available measurement techniques, and the statistical tools for the analysis of the results.

DESCRIPTION OF CONTENTS: PROGRAMME

Theoretical fundamentals of experimental aerodynamics: Buckingham pi theorem, fundamental equations and non dimensional numbers.
Statistical data characterization and elements of data processing
Experimental facilities and wind tunnel testing
Aim and principles of flow visualization
Flow pressure measurements
Temperature and heat-flux measurements
Density-based methods
Thermal Anemometry
Laser Anemometry
Volumetric Velocimetry
Measurement of wall shear stresses
Force and moments measurements

LEARNING ACTIVITIES AND METHODOLOGY

AF1 - Theoretical session
AF2 - Practical session
AF3 - Computer room practical session
AF4 - Laboratory sessions
AF5 - Individual student work
AF6 - Tutorials
AF7 - Partial and final exams

MD1 - Class lectures by the professor with the support of computer and audiovisual media, in which the main concepts of the subject are developed and the bibliography is provided to complement the student's learning.
MD3 - Resolution of practical cases, problems, etc. posed by the teacher individually or in groups.
MD5 - Preparation of reports individually or in groups.

ASSESSMENT SYSTEM

% end-of-term-examination/test: 25

% of continuous assessment (assignments, laboratory, practicals...): 75

1) to have a MINIMUM mark of 4.0/10 in the end-of-term exam;

2) to have a minimum overall mark of 5.0/10 (weighting 25% the end-of-term exam mark and 75% the mark of the continuous evaluation).

Note that in the extraordinary call it is possible to pass the course either by completing the previous points or by obtaining a MINIMUM grade of 5.0/10 (valuing the final exam 100%)

BASIC BIBLIOGRAPHY

- Alexander J. Smits, T. T. Lim Flow Visualization: Techniques and Examples, ICP, 2012
- Stefano Discetti, Andrea Ianiro Experimental Aerodynamics, CRC Press , 2017

ADDITIONAL BIBLIOGRAPHY

- Miguel A. Mendez, Andrea Ianiro, Bernd R. Noack, Steven L. Brunton Data-Driven Fluid Mechanics Combining First Principles and Machine Learning, Cambridge University Press, 2022