Guia docent
205245 - ELF - Laboratoris Experimentals en Fluids

Unitat responsable: Escola Superior d'Enginyeries Industrial, Aeroespacial i Audiovisual de Terrassa
Unitat que imparteix: 729 - MF - Departament de Mecànica de Fluids.

Curs: 2022              Crèdits ECTS: 3.0              Idiomes: Anglès

PROFESSORAT

Professorat responsable: Raush Alviach, Gustavo Adolfo
Altres: Quintana Valmitjana, Marc

METODOLOGIES DOCENTS

The teaching methodology is divided into three parts:
- In the exposition sessions, the faculty will introduce the theoretical bases of the syllabus, basic concepts of the methods and results examples to illustrate the interpretations of the same. The presentation will make interactive use of tools such as the use of Matlab and Python-based programs. Mostly, the general concepts and calculation procedure will be presented in the Jupyter-notebook Python environment. Nevertheless, students are allowed to be open-minded and proactive to use any other tools that will be considered helpful in the course to get the final results.
- In the laboratory work sessions, the faculty will guide the students in applying the theoretical concepts for the resolution of experimental setups, basing at all times the critical reasoning. Activities will be proposed to the students to solve in the classroom and out of the classroom to favor the contact and use of the basic tools necessary for the realization of an instrumentation system.
- Autonomously, the students have to work on the material provided by the teachers and the result of the laboratory work sessions to assimilate and fix the concepts. The faculty will provide a study plan and follow-up activities (ATENEA).

OBJECTIUS D'APRENENTATGE DE L'ASSIGNATURA

1. To have obtained the knowledge, understanding, application capacity, and analysis of the measurement processes applied in fluid mechanics.
2. To have the knowledge and understanding of the analysis of random series applied to the measurement of turbulent flow.
3. Knowledge, understanding, application and analysis of experimental techniques to measure pressure, temperature and velocity in open and closed flows.
4. To have the ability to choose, among different experimental tools, the most appropriate ones to obtain relevant information on a Fluid Mechanics problem.
5. Identify the limitations of the chosen techniques, the errors made and reported the results obtained, in a critical and self-sufficient way.

HORES TOTALS DE DEDICACIÓ DE L'ESTUDIANTAT

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</tbody>
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Dedicació total: 75 h
CONTINGUTS

Module 1: Pressures and Errors and Uncertainties

Descripció:

Activitats vinculades:
Individual deliverable work assigned to the content of the module. Ad-hoc laboratory session. Preparation of laboratory activity report. Examples of Activities in laboratory: Pressure measurements on dynamic probes. Density measurements of manometric fluids

Dedicació: 12h 30m
Grup gran/Teoria: 5h
Aprenetatge autònom: 7h 30m

Module 2: Velocity and Flow rate

Descripció:
Dynamic probes, Pitot tubes
Hot-wire anemometry: Principles and applications
Other thermal velocity probes: thermistors and vane probes.
Flow rate measurements. Principle of orifices and contractions
Flow measurements of free discharges and fan’s flows

Activitats vinculades:

Dedicació: 12h 30m
Grup gran/Teoria: 5h
Aprenetatge autònom: 7h 30m

Module 3: Boundary Layer

Descripció:

Activitats vinculades:
Individual deliverable work assigned to the content of the module. Ad-hoc laboratory session. Preparation of laboratory activity report. Examples of Activities in laboratory: Measurement of the boundary layer profile. Analysis of conventional dynamic probes and Stanton probe

Dedicació: 12h 30m
Grup gran/Teoria: 5h
Aprenetatge autònom: 7h 30m
Module 4: Aerodynamic Forces and Moments

Descripció:

Activitats vinculades:
Individual deliverable work assigned to the content of the module. Ad-hoc laboratory session. Preparation of laboratory activity report. Examples of Activities in laboratory: Aerodynamic force measurements at wind tunnels using the methods of: momentum (Betz method) and aerodynamic balance.

Dedicació: 12h 30m
Grup gran/Teoria: 5h
Aprenentatge autònom: 7h 30m

Module 5: Flow Visualization

Descripció:

Activitats vinculades:
Individual deliverable work assigned to the content of the module. Ad-hoc laboratory session. Preparation of laboratory activity report. Examples of Activities in laboratory: Visualization of the flow detachment in aerodynamic bodies like: cylinder, airfoil, scale model of a passenger car, etc.

Dedicació: 12h 30m
Grup gran/Teoria: 5h
Aprenentatge autònom: 7h 30m

Module 6: Recap

Descripció:
Complementation of masterclasses aimed at solving doubts and concepts.

Activitats vinculades:
Oral presentations an recap old sessions.

Dedicació: 12h 30m
Grup gran/Teoria: 5h
Aprenentatge autònom: 7h 30m
SISTEMA DE QUALIFICACIÓ

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Penalties:
- The use of wrong dimensional and conceptual errors from previous subjects such as: fluid mechanics, fluid engineering, or similar. The students must to be careful and precise with concepts and principles used in the report writing and descriptions.
- the mistakes on reporting of results without units and wrong units of the measurement systems will be severely penalized.

The final score will be calculated as the following algorithm:
- 25% of the grade will be assigned to the 5 individual deliverables that the teaching staff will publish in order to consolidate concepts and techniques necessary in the preparation of future reports. Each activity has a weight of 5% in the final grade.
- 75% will be assigned to laboratory activities. Your contributions will be divided as follows: o Four activities will have a contribution of 15% on the final grade o The remainder has its composition in 5% in the report and 10% in the oral presentation of the group. The group note is common to its members.