

29820 - Fluid Mechanics

Syllabus Information

Academic year: 2023/24

Subject: 29820 - Fluid Mechanics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

ECTS: 6.0

Year: 3

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The subject belongs to the group of compulsory disciplines of the industrial branch, and presents basic knowledge of the Fluid Mechanics adapted to the needs of the graduate engineer in Electronics and Automation. Given the generalist nature of the course, the program is broad and deals mainly with basic aspects that will provide a solid foundation and technical-scientific rigor.

Previous knowledge of Physics and Mathematics is required. In particular, it is necessary to know: the origin and meaning of forces and moments; properties of and operations with vectors and matrices; calculation of derivatives (total and partial) and integrals (definite and indefinite; surface and volume); differential operators such as the vector operator nabla in its different forms; physical meaning and manipulation of differential and integral equations.

Continued study and work are fundamental for the structured acquisition of knowledge and the passing of this subject. The subject objectives are aligned with the following SDGs: Goal 6, target 6.4. Goal 8, target 8.2.

Goal 9, target 9.5.

2. Learning results

- Know how to describe a flow by means of its characteristic lines.
- Interpret the physical meaning of conservation equations.
- Know how to balance mass, forces, angular momentum and energy over control volumes.
- Employ dimensional analysis techniques to design experiments and order of magnitude analysis to simplify problems.
- Know the characteristics of the main flows of interest in engineering (external aerodynamics, duct flow, boundary layer flow, thin film flow),
- Know the working principles and operation of basic instruments for measuring pressure, flow, velocity and viscosity, .
- Know the basics of oil hydraulics and pneumatics.

3. Syllabus

- Introduction.
- Fundamental equations of Fluid Mechanics.
- Canonical flows.
- Dimensional analysis and similarity.
- Fluid installations.
- Boundary layer and aerodynamics.

4. Academic activities

- Classroom - type T1 (30 hours): Theory classes and problem solving techniques.
- Problem classes and case resolution - type T2 (20 hours): Problem solving case studies in reduced groups and with the participation of the student.
- Laboratory practicals - type T3 (10 hours): Laboratory and computer practice under the supervision of a teacher.
- Study - type T7 (83 hours).
- Assessment tests (type T8) (7 hours).

At EUPT, the course is taught in two different modalities: in classroom and blended learning. For the presential modality all of the above applies. In the blended mode, lectures are replaced by asynchronous learning activities with adapted materials, with the support of the teacher as a guide and for the resolution of doubtsthrough telematic tools.

5. Assessment system

Rios Ebro Campus (Zaragoza)

Continuous assessment

The continuous assessment is in addition to the ordinary exams, and consists of 3 controls throughout the teaching period, which weigh 100% of the grade (subject to conditions, see below); the scheduled dates are announced at the beginning of the term in the Digital Teaching Ring. A control can group several subjects, which are evaluated independently.

Students may, during the term, obtain increments to this grade for interventions and participation in class (positive), which are added to this final grade.

The check may be a combination of: short theory questions; longer theory questions (e.g., a half-page demonstration or development); short questions of a practical nature; directly related questions; and questions of a practical nature; questions directly related to the lab practicals; or a problem.

A form can be available at the beginning of the term, as well as the scripts of the practices and the reports, written by the student and in his own handwriting.

To pass the subject through continuous assessment it is necessary to pass each of the six subjects; or, if N subjects are failed, the average of the totality of the controls must be at least $5+0.5*N$. The class positives add up to to calculate this limit. There is no retaking of failed controls. The passed controls do not eliminate subject matter for the official exam of the call.

Global test in official calls:

Students can pass the subject through the continuous assessment procedure described above. The student who does not pass the subject in this way will be evaluated by means of an exam, to be taken on official dates, which consists of three parts:

- Theory, with (approximately) 8 questions that can be purely theory or a brief practical application; Problems, with 2 longer problems;
- Practices, with about 5 questions related to them.

The final grade for the subject is calculated as follows:

$$\text{final_grade} = 0.3 * \text{theory} + 0.6 * \text{problems} + 0.1 * \text{practice} + \text{class_positives}$$

The same material is available for the exam as for continuous assessment.

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Continuous assessment

The continuous assessment is additional to the ordinary exams, and consists of several tests to be carried out throughout the term that weigh 85% of the grade (subject to conditions, see below), plus a practice grade (which weighs 15%). The grade of is obtained from the evaluation of a practical work (which weighs 10%) and the practical scripts (which weighs 5%).

Students may, during the term, obtain additions to this grade for interventions and participation in class ('positives'), which are added to this final grade.

The controls last approximately one hour. The check may be a combination of: short theory questions; longer theory questions (e.g., a half-page demonstration or development); short questions of a practical nature; or a problem.

In the controls you can have a form, of increasing size throughout the term, which can not have figures, deductions, demonstrations or descriptive text.

In order to pass the subject by means of continuous assessment, the following conditions are necessary:

- The average grade of controls (weight 85%) and practices (weight 15%) must be at least 5.
- Obtain a minimum grade of 4 in each one of the tests and in the practicals. There is no 'repayment' of suspended controls. Passed controls do not eliminate subject matter for the official exam call.

Global test in official calls

Students can pass the subject through the continuous assessment procedure described above. The student who does not pass the subject in this way will be evaluated by means of an exam, to be taken at the following official calls, which will include:

- Theory, with several questions that can be purely theoretical or a brief practical application;
- Problems;
- Practices, with several questions related to internships. Only for those who have not achieved a 4 in the practical part in continuous assessment.

The final grade for the subject is calculated as follows:

$$\text{Final_grade} = 0.25 * \text{Theory} + 0.65 * \text{Problems} + 0.1 * \text{Practicals} + \text{Class_Positives}$$

The same material is available for the exam as for continuous assessment.