

## 28829 - Fluid Mechanics: Systems and Machines

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	175 - Escuela Universitaria Politécnica de La Almunia
<b>Degree</b>	424 - Bachelor's Degree in Mechatronic Engineering
<b>ECTS</b>	6.0
<b>Course</b>	3
<b>Period</b>	Second semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **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 designed for this subject is based on the following:**

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher.

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The current subject, systems and fluid machines, is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities..

The organization of teaching will be carried out using the following steps:

&mdash; **Theory Classes** : Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.

&mdash; **Practical Classes** : The teacher resolves practical problems or cases for demonstrative purposes.

&mdash; **Laboratory Workshop** : The lecture group is divided up into various groups, according to the number of registered students.

&mdash; **Individual Tutorials** : Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

### 5.2.Learning activities

**The programme offered to the student to help them achieve their target results is made up of the following activities...**

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

&mdash; **Face-to-face generic activities** :

&#9679; **Theory Classes** : The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.

&#9679; **Practical Classes and Laboratory Workshop** : Problems and practical cases are carried out, complementary to the theoretical concepts studied.

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&mdash; **Generic non-class activities :**

&#9679; Study and understanding of the theory taught in the lectures.

&#9679; Understanding and assimilation of the problems and practical cases solved in the practical classes.

&#9679; Preparation of seminars, solutions to proposed problems, etc.

&#9679; Preparation of laboratory workshops, preparation of summaries and reports.

&#9679; Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree.

<b>Activity</b>	<b>Weekly school hours</b>
Lectures	2
Laboratory Workshop	2
Other Activities	6

### 5.3.Program

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The contents are distributed in five teaching units forming treatment indivisible blocks. These topics collect the contents needed for the acquisition of predetermined learning outcomes.

<p><b>Tema 1</b></p>	<p><b>Fluid machines</b></p> <p>Classification</p> <p>Euler equation.</p> <p>Momentum theorem. Triangle speeds.</p> <p>Classification of hydraulic pumps.</p>
<p><b>Tema 2</b></p>	<p><b>Rotodynamic pumps</b></p> <p>Similarity relations.</p> <p>The impeller.</p> <p>Yield and Power.</p> <p>Characteristic curves.</p> <p>Applications in industrial systems.</p>
<p><b>Tema 3</b></p>	<p><b>Fans and hydraulic turbines</b></p> <p>Definition and classification. Action and Reaction turbines. Net height. Losses, yield and power. Applications in industrial systems.</p>
<p><b>Tema 4</b></p>	<p><b>Study Pneumatic-hydraulic components.</b></p> <p>Design techniques of hydraulic and pneumatic circuits.</p> <p>Calculation of the installation and its elements.</p> <p>Transmissions and hydraulic and pneumatic controls</p>

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	<p>Interpretation of phase diagrams in the study sequences.</p> <p>Control schemes, automatic wiring</p> <p>Applications in the design, optimization and maintenance of circuits.</p>
<b>Tema 5</b>	<b>Final project on practical application</b>

<b>Issues</b>	<b>Problems on pumps, fans and turbines.</b>
<b>Workshop</b>	<b>Circuit design using simulators and training equipment</b>
<b>Workshop</b>	<b>Design and assembly of servo systems. Control systems and control strategies.</b>
<b>Workshop</b>	<b>Automatic control circuits</b>

### 5.4.Planning and scheduling

Schedule of Face-to-face generic activities and presentation of papers

The dates of the final exams will be those that are officially published at <http://eupla.unizar.es/index.php/secretaria/informacion-academica/distribucion-de-examenes>

Test 1 date will be defined during the course for students who choose the continuous evaluation system.

\* The final dates will be published in digital platform (moodle)

In continuous evaluation methodology, the students delivering a final work that will be defined during the course.

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\* The final dates will be published in digital platform (moodle)

The overall test for not continuous evaluation system will be set at the end of the semester and will consist of a written test based on theoretical arguments and problems of all topics covered in class.

### 5.5. Bibliography and recommended resources

- Giles, Randal V.. Mecánica de los fluidos e hidráulica / Randal V. Giles, Jack B. Evett, Cheng Liu ; traducción y adaptación, Jaime Moneva Moneva . - 2ª ed. española, [reimp.] Madrid [etc.] : McGraw-Hill, D. L. 2003
- Agüera Soriano, José. Mecánica de fluidos incompresibles y turbomáquinas hidráulicas / José Agüera Soriano . - 5ª ed. act. Madrid : Ciencia 3, D.L. 2002
- Jaría , Juan Diego. Apuntes de la asignatura "Sistemas y máquinas fluidomecánicas" / Juan Diego Jaría. - 1ª edición La Almunia (Zaragoza):EUPLA, 2012
- Carnicer Royo, Enrique. Bombas centrífugas / Enrique Carnicer Royo , Concepción Mainar Hasta . - 2ª ed. Madrid : Paraninfo Thomson Learning, D.L. 2001
- Carnicer Royo, Enrique. Oleohidráulica : conceptos básicos / E. Carnicer Royo, C. Mainar Hasta . - 2ª ed., 2ª reimp. Madrid : Thomson Paraninfo, imp. 2003