

## 28829 - Fluid Mechanics: Systems and Machines

### Syllabus Information

**Academic Year:** 2019/20

**Subject:** 28829 - Fluid Mechanics: Systems and Machines

**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia

**Degree:** 424 - Bachelor's Degree in Mechatronic Engineering

**ECTS:** 6.0

**Year:** 3

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:** ---

## 1.General information

### 1.1.Aims of the course

The subject studies the behavior of fluids through their path and hydraulic machines. In the course, students will apply theories of fluids mechanical machine systems in a wide variety of applications.

### 1.2.Context and importance of this course in the degree

The subject "Fluid Mechanics: Systems and Machines" focuses on the calculation and design of hydraulic systems. The selection of the optimum machine type in the design of an installation involves the appropriate choice of components and materials.

### 1.3.Recommendations to take this course

The subject "Fluid Mechanics: Systems and Machines" has not had mandatory prerequisites, but students of the Degree in Mechatronics are advised to have passed the previous subject of Fluid Engineering.

## 2.Learning goals

### 2.1.Competences

### 2.2.Learning goals

### 2.3.Importance of learning goals

## 3.Assessment (1st and 2nd call)

### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

## 4.Methodology, learning tasks, syllabus and resources

### 4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

1 Lectures: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary, focus on the calculation of installation, the characteristic curves of pumps/fans/ turbines and the calculation and development of industrial applications based on Hydraulic systems

2. Laboratory Workshop. These classes are highly recommended for a better understanding of the concepts because those items whose calculation is done in theory classes are shown in working mode.

3. Tutorials related to any concept of the subject. This activity is developed in a face-to-face mode with a defined schedule or through the messaging and forum of the virtual classroom Moodle.

## 4.2.Learning tasks

The course includes the following learning tasks:

- Lectures. it will take 4 hours per week till the 40 hours, necessary to accomplish the objectives of the subject study, will be reached
- Laboratory Workshop. it will take 10 sessions of 2 hours duration. The group is divided up into various groups, according to the laboratory capacity.
- Study and personal work. This non-face-to-face part is valued in about 90 hours, necessary for the study of theory, problem solving and revision of documents
- Individual tutorials. Each teacher will publish a schedule of attention to the students throughout the four-month period

## 4.3.Syllabus

The course will address the following topics:

- Topic 1. Fluid machines Classification, Euler equation, Momentum theorem, Triangle speeds, Classification of hydraulic pumps.
- Topic 2. Rotodynamic pumps, Similarity relations, The impeller, Yield and Power, Characteristic curves, Applications in industrial systems.
- Topic 3. Fans and hydraulic turbines, Definition and classification. Action and Reaction turbines, Net height. Losses, yield and power, Applications in industrial systems...
- Topic 4. Study Pneumatic-hydraulic components, Design techniques of hydraulic circuits, Calculation of the installation and its elements, Transmissions and hydraulic controls, Interpretation of phase diagrams in the study sequences, Control schemes, automatic wiring, Applications in the design, optimization and maintenance of circuits.
- Topic 5. Final project on the practical application

## 4.4.Course planning and calendar

The theory classes and problems are given in the timetable established by the faculty, as well as the hours assigned to the practices.

The presentation of the works will be done on the last day of class of the subject.

## 4.5.Bibliography and recommended resources

[http://biblos.unizar.es/br/br\\_citas.php?codigo=28829&year=2019](http://biblos.unizar.es/br/br_citas.php?codigo=28829&year=2019)