

## 28713 - Hydraulic Engineering: the Basics

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	175 - Escuela Universitaria Politécnica de La Almunia
<b>Degree</b>	423 - Bachelor's Degree in Civil Engineering
<b>ECTS</b>	6.0
<b>Course</b>	2
<b>Period</b>	First 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. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

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The current subject 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:

– **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.

– **Practical Classes** : The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.

– **Laboratory Workshop** : The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.

– **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:

– **Face-to-face generic activities** :

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

– **Practical Classes** : Problems and practical cases are carried out, complementary to the theoretical concepts studied.

– **Laboratory Workshop** : This work is tutored by a teacher, in groups of no more than 20 students.

– **Generic non-class activities** :

– Study and understanding of the theory taught in the lectures.

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• Understanding and assimilation of the problems and practical cases solved in the practical classes.

• Preparation of seminars, solutions to proposed problems, etc.

• Preparation of laboratory workshops, preparation of summaries and reports.

• 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, taking into account the level of experimentation considered for the said subject is moderate.

<b>Activity</b>	<b>Weekly school hours</b>
Lectures	3
Laboratory Workshop	1
Other Activities	6

Nevertheless the previous table can be shown into greater detail, taking into account the following overall distribution:

– 40 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.

– 10 hours of laboratory workshop, in 1 or 2 hour sessions.

– 6 hours of written assessment tests, one hour per test.

– 4 hours of PPT presentations.

– 90 hours of personal study, divided up over the 15 weeks of the 2<sup>nd</sup> semester.

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There is a tutorial calendar timetable set by the teacher that can be requested by the students who want a tutorial.

### 5.3.Program

Theory

Topic 1: Introduction to Hydraulic Engineering

Topic 2: Hydrostatic

Topic 3: Kinematics of fluids

Topic 4: Fluid dynamics

Topic 5: Hydraulic pumps and valves

Topic 6: Calculation of distribution network of pressured pipes

Practical contents

Almost all the subjects mentioned in the previous section are related to exercise and laboratory experience.

Problems Topic 1

Problems on fluid compressibility.

Problems Topic 2

Problems on hydrostatic systems, calculating the intensity and the location of hydrostatic force

Problems Topic 4

Problems on the fluid dynamics equation (conservation of mass, energy and momentum)

Problems Topic 5

Problems on hydraulic pumps, valves and cavitation

Problems Topic 6

Problems on pressure piping systems

Practice 1: Pressure gauges

Practice 2: Viscosity

Practice 3: Hydrostatic force on vertical and inclined gates

Practice 4: Osborne Reynolds apparatus for flow regime analysis

Practice 5: Study of Bernoulli equation and the concept of pressure loss through the Venturi tube.

### 5.4.Planning and scheduling

**Schedule sessions and presentation of works**

The dates of the two final exams will be published on the official web page

<http://www.eupla.es/secretaria/academica/examenes.html> before the class period starting. Other relevant dates will be communicated by the professor using Moodle platform.

### 5.5.Bibliography and recommended resources

- López Andrés, Lázaro. Manual de hidráulica / Lázaro López Andrés Alicante : Universidad de Alicante, 1997
- Russo, B.. Apuntes de la asignatura Fundamentos de Ingeniería Hidráulica. 1ª ed La Almunia: EUPLA.
- Duilio Citrini, Giorgio Nosedà. Idraulica CEA,1987
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