Universidad Zaragoza

Year : 2019/20

28713 - Hydraulic Engineering: the Basics

Syllabus Information

Academic Year: 2019/20
Subject: 28713 - Hydraulic Engineering: the Basics
Faculty / School: 175 -

Degree: 423 - Bachelor's Degree in Civil Engineering

ECTS: 6.0
Year: 2
Semester: First semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

The main objective of the course is to get students to acquire knowledge of the concepts and technical aspects related to hydrostatic systems and pressured pipes systems.

1.2.Context and importance of this course in the degree

The course "Hydraulic Engineering: the Basics", with 6 ECTS credits, is a subject of the EUPLA Degree in Civil Engineering. It is a semestral and mandatory subject of the second year of the degree.

The main objective of this subject, jointly to the other subject "Extension of hydraulic engineering and hydrology", is to provide a solid knowledge about fundamental hydraulics and hydrology to be used in more practical courses like "Hydraulic Works and Hydroelectric Exploitation", "Hydraulic infrastructures in urban environment", "Fluvial Hydraulics", Extension of Surface Hydrology", etc.

1.3.Recommendations to take this course

The subject of "Hydraulic Engineering: the Basics" has not mandatory prerequisites although it is advisable to students who take it to have previously passed the subjects of Mathematics applied to Engineering I and II, and General Physics of the Civil Engineering Degree.

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 learning process designed for this subject is based on the following:

- Strong interaction between the professor and the 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 professor.

- 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 professor, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- **Practical Classes**: The professor 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 5 students, in order to make up smaller sized groups.
- **Individual Tutorials**: Those carried out giving individual, personalized attention with a professor from the department. Said tutorials may be in person or online.

4.2.Learning tasks

The learning process is based on the following activities:

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 professor, in groups of no more than 5 students.

Generic non-class activities:

- Study and understanding of the theory taught in the lectures.
- 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 data 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.

Activity	**Weekly school hours**
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:

- 44 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.
- 10 hours of laboratory workshop, in 1 or 2 hour sessions.
- 4 hours of written assessment tests, two hours per test.
- 2 hours of PPT presentations.
- 90 hours of personal study, divided up over the 15 weeks of the 2nd semester.

4.3.Syllabus

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

All the subjects mentioned in the previous section are related to excercises 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

4.4.Course planning and calendar

Scheduled sessions and presentation of works

The dates of the two final exams will be published on the EUPLA official web page before the class period starting.

Other relevant dates regarding intermediate assessment and presentation of autonomous works and studies will be communicated by the professor the first day of the course and published on Moodle platform.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28713&year=2019