

28921 - Hydraulics

Syllabus Information

Academic Year: 2020/21

Subject: 28921 - Hydraulics

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 583 - Degree in Rural and Agri-Food Engineering
437 - Degree in Rural and Agri-Food Engineering

ECTS: 6.0

Year: 3

Semester: First semester

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

The overall goal of the Hydraulics course is simply to give students a sound foundation in hydraulics, a discipline which is absolutely essential for certain areas of the work of graduates in agricultural engineering and the rural environment.

1.2.Context and importance of this course in the degree

This course, which takes place in the first term of the third year of the degree, makes use of what students have learned in Physics I and Mathematics I and II to ensure students have a good understanding of free surface flow hydraulics and pressurised flow hydraulics, which will prepare them for more in-depth studies of irrigation and drainage (in the special subjects of Farming or Horticulture and Gardening) or for designing and managing hydraulic installations (a specialisation in Agro-Food Industries).

The course includes competencies and activities related to the Sustainable Development Goals 6 and 7 (SDG6 and SDG7) of the United Nations (UN):

SDG6 - Ensure availability and sustainable management of water and sanitation for all.

SDG7 - Ensure access to affordable, reliable, sustainable and modern energy for all.

1.3.Recommendations to take this course

You are strongly recommended to have acquired the Fluid Mechanics skills taught in Physics I, and all the skills in Mathematics I and Mathematics II.

Students who want to pass the subject with continuous assessment must spend an estimated six hours a week on coursework and personal study over the term, as well as attending scheduled classroom sessions (theory, problems, laboratory work, computer work, etc.).

In all cases, attending classroom activities is strongly recommended.

2.Learning goals

2.1.Competences

Knowing, understanding and using the principles of engineering in the rural environment: hydraulics.

Understanding the basis of hydraulics in irrigation and drainage.

Applying in practice the foundations of hydraulics for irrigation and drainage.

Making basic use of hydraulics software for irrigation and drainage.

Basic management of hydraulic installations.

Applying this knowledge to their work in a professional manner and having skills that can be demonstrated by preparing and defending an argument and resolving problems within their area of study.

Compiling and interpreting relevant information (normally in their area of study) in order to express opinions that include a consideration of relevant social, scientific and ethical subjects.

2.2.Learning goals

Understanding and applying the basic principles of Hydraulics in both free surface flow and pressurised flow.

Ensure efficient use of water resources and ensure sustainability in the extraction and supply of fresh water (in line with SDG6).

Achieve energy efficiency in pumping systems, using affordable, reliable and modern energy services, based on renewable energies as far as possible (in line with SDG7).

Designing and analysing basic hydraulic installations, in both free surface flow and pressurised flow, taking into account SDG6 and SDG7.

Basic use of hydraulic simulation software.

2.3.Importance of learning goals

The planned learning results serve as a foundation for more in-depth studies of irrigation and drainage (in the special subjects of Farming or Horticulture and Gardening) or for designing and managing hydraulic installations (a specialisation in Agro-Food Industries).

In particular, the study of hydraulics must enable graduates to perform their professional work relating to capturing and transporting water, its application to a field or crop (irrigation), and drainage. Also, graduates can use the skills they have acquired to design and manage hydraulic installations in the agro-food industry.

3.Assessment (1st and 2nd call)

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

This course can be taken in **continuous assessment** mode, basically consisting of a objective assessment test at the end of block 1 (free surface flow). Both continuous assessment tests consist of a theory and practice test and a second part with written practical exercises.

There will also be **overall tests** corresponding to the two main exam periods of the academic year. An overall test will be in two parts: one relating to the free surface flow block and the other relating to the pressurised flow block. Each of them will consist of a theory and practice test and a second part with written practical exercises.

The content to be evaluated in the assessments will be all the content taught and indicated in all the classroom-based activities in the subject: theory, problems, computer work, laboratory work and special practical work.

Assessment Criteria.

To pass either of the two subject blocks students will need a mark of five points or more in the corresponding assessment test.

To pass the subject they must pass each of the two blocks. In this case the mark will be the average of the marks obtained in each block.

Otherwise the subject will be considered not to have been passed, and the mark will be the average of the marks obtained for each block, unless that value is higher than the pass mark, in which case the mark given will be the lower of the two blocks.

In an overall exam, when students have previously passed the assessment for a single block, they may take the exam for the other block only, always in the same academic year. They can also take an overall exam after passing both blocks in continuous assessment, in order to improve their marks.

As indicated above, the test for each of the two subject blocks, whether in continuous assessment or the overall exam, will consist of a theory and practice test and a second part with written practical exercises.

The **theory and practice test** will be taken without study material and with a non-programmable calculator, and is a qualifying exam: it must be passed for the written practical exercises to be marked. Wrong answers in the test may lower the mark. The test questions are designed to evaluate the level of understanding of the theoretical and practical content of the subject, not the students' memorising skills.

The **written practical exercise** will consist of a set of practical problems which can be resolved with the study materials the student considers appropriate. When a problem or one of its sections requires a numerical answer, the student must include the working out. A problem or section will be considered to be passed if the value is within a margin of $\pm 5\%$ of the correct result, and the mark will be adjusted according to the clarity of the explanations and the scientific rigour used to obtain the result.

The mark for the block will be that of the theory and practice test if failed, and the the weighted average of the theory and practice test (40%) and the written practical exercises (60%) if passed.

As part of the evaluation of the subject, the evaluation of competences and theoretical-practical learning related to SDG6 and SDG7 will be taken into account.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
Theory	B1 2h	B1 2h	B1 2h	B1 2h	B1 2h	B1 2h	B1 2h		B2 2h	B2 2h	B2 2h	B2 2h	B2 2h	B2 2h	B2 2h	28 h
Practice		B1 2h	B1 5h						B2 2h	B2 2h	B2 2h	B2 2h				15 h
Laboratory				P1 2h	P1 2h	P1 2h						P2 2h	P2 2h	P2 2h		12 h
Field practice							B1 5h									5 h
<i>Total presential activities</i>																60 h
Personal work	B1 6h	B1 6h	B1 6h	B1 6h	B1 6h	B1 6h	B1 6h	B1 6h	B2 6h	B2 6h	B2 6h	B2 6h	B2 6h	B2 6h	B2 6h	90 h
<i>Total non presential activities</i>																90 h
TOTAL ACTIVITIES																150 h

4.5. Bibliography and recommended resources

- BB** Losada Villasante, Alberto. El riego : fundamentos hidráulicos / A. Losada Villasante . 4ª ed. corr. Madrid [etc.] : Mundi-Prensa, 2009
- BC** Arviza Valverde, Jaime. Ingeniería rural : hidráulica / Jaime Arviza Valverde, Cristina Santamarina Siurana . Valencia : Universidad Politécnica, Servicio de Publicaciones, D.L.1995
- BC** Arviza Valverde, Jaime. Problemas de hidráulica / Jaime Arviza Valverde, Iban Balbestre Peralta . Valencia : Editorial de la UPV, D. L. 2008
- BC** Paco López-Sánchez, José Luis de. Fundamentos del cálculo hidráulico en los sistemas de riego y drenaje / José Luis de Paco López-Sánchez . Madrid : Mundi-Prensa : MAPA-IRYDA, D.L. 1993
- BC** Problemas de hidráulica para riegos / José Roldán ... [et al.] . 2ª ed. corr. Córdoba : Servicio de Publicaciones de la Universidad de Córdoba, D.L. 2004

The updated recommended bibliography can be consulted in:
<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28921>