Universidad Zaragoza

Year : 2020/21

28757 - Fluvial Hydraulics

Syllabus Information

Academic Year: 2020/21
Subject: 28757 - Fluvial Hydraulics
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 423 - Bachelor's Degree in Civil Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

The subject and its expected results respond to the following approaches and objectives:
Objectives of the course: Fluvial hydraulics has its differentiating characteristics with respect to the basic concepts of hydraulics that require a separate study for the best preparation of the student who used to calculate with fixed boundary conditions.
Fluvial hydraulics is of great importance in a country used to devastating flood actions and this course will allow the student to have the necessary knowledge to participate in analyses, studies and projects related to the river from all points of view.
The student will get to know the basic concepts, the current design trends and the most suitable ways to carry out the projects.

1.2.Context and importance of this course in the degree

The subject of Fluvial Hydraulics is part of the Degree in Civil Engineering taught by EUPLA and is part of the group of subjects that make up the module called Specific Training. This is a optional fourth-year subject located in the first semester (OB), with a teaching load of 6 ECTS credits.
This subject corresponds to a specific speciality of the profession of Civil Engineer suitable for the professional development of the graduate.

1.3.Recommendations to take this course

There are no prerequisites to take this course. However, the contents to be studied will require the skills and abilities acquired in the following subjects, mainly.
- Graphic Expression: The graphic resources are necessary to represent the technical solutions associated with the subject. CAD programs will be used.
- Geology: The study of riverbeds requires a basic knowledge of geology.
- Geotechnics: The study of sediment transport requires to know basic geotechnical concepts.
- Fundamentals of Hydraulic Engineering and Extension of Hydraulic Engineering and Hydrology: The concepts of these subjects are necessary for the use in the course.
- Enlargement of superficial hydrology: The concepts of this subject are necessary for the use in the course.
- Topography: The hydrographic basins are expressed in a graphical way on the real terrain, for it, it is necessary to manage the topographic tools
- Mathematics: Problem solving requires the application of equations, hypotheses and calculation strategies acquired in these subjects.

2.Learning goals

2.1.Competences

By passing the course, the student will be more competent to...
Carry out flooding analysis, characterization of the hydraulic public domain and flood studies

To combine basic and specialized knowledge of River Engineering to carry out infrastructure projects in rivers

Analyze river morphodynamics and solid flow problems

Modelling in one and two dimensions the river courses and having the necessary criteria to choose the most suitable alternative

Among the competencies defined in the verification report, those related to this subject are the following:

EH1. Knowledge and ability to project and size hydraulic works and installations, energy systems, hydropower and surface

and underground water resources planning and management.

G01. Organizational and planning capacity

G02. Problem solving capabilities

G03. Decision-making Capacity

G04. Ability to communicate orally and in writing in the native language

G05. Analysis and synthesis capacity

G06. Information management capability

G07. Ability to work in a team

G08. Capacity for critical thinking

G09. Ability to work in an interdisciplinary team

G10. Ability to work in an international context

G11. Improvisation and adaptation capacity to face new situations

G12. Leadership skills

G13. Positive social attitude towards social and technological innovations

G14. Ability to reason, discuss and present one's own ideas

G15. Ability to communicate through word and image

G16. Ability to search, analyze and select information

G17. Capacity for autonomous learning

G18. Possessing and understanding knowledge in an area of study that is at the core of general secondary education, and is usually at a level, which while supported by advanced textbooks, also includes some aspects involving knowledge from the cutting edge of their field of study.

G19. Apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the development and defence of arguments and problem-solving within their area of study.

G20. Ability to gather and interpret relevant data (usually within their area of study) to make judgements that include reflection on relevant social, scientific or ethical issues

G21. Convey information, ideas, problems and solutions to both specialized and non-specialized audiences

G22. Develop those learning skills necessary to undertake further study with a high degree of autonomy

G23. Know and understand respect for fundamental rights, equal opportunities between women and men, universal accessibility for people with disabilities, and respect for the values of the culture of peace and democratic values.

G24. Encourage entrepreneurship.

G25. Information and communication technology skills.

2.2.Learning goals

In order to pass this course, the student must demonstrate the following results...
Know the basic and advanced concepts of river morphodynamics

It will be able to handle the most common software for numerical modelling of river flows in one and two dimensions

You will have the necessary knowledge to carry out a river survey

It will be able to design the infrastructure associated with the river works

2.3.Importance of learning goals

This course has a marked engineering character. It offers a preparation with contents of immediate application in the labor and professional market. Through the achievement of the relevant learning results, the necessary capacity for flood management, and the concept, design and operation of river infrastructures is obtained.

3.Assessment (1st and 2nd call)

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

The student must demonstrate that he/she has achieved the intended learning outcomes through the following assessment activities
Assessment is a basic element in the entire teaching-learning process, since it is the only mechanism that makes it possible, at any time during an educational period, to detect the degree to which the proposed learning outcomes have been achieved and, if necessary, to apply the necessary corrections.

Assessment should be understood as a continuous and individualized process throughout the entire teaching-learning period, with priority given to evaluating the capacities, attitudes and skills of each student, as well as their performance.

The student evaluation process will include two types of performance:

- A system of continuous evaluation, which will be carried out throughout the entire learning period.

- A comprehensive evaluation test reflecting the achievement of learning outcomes, at the end of the learning period.

These assessment processes will be carried out through:

- Direct observation of the student in order to know his/her attitude towards the subject and the work it requires (attention in class, completion of assigned work, resolution of questions and problems, active participation in the classroom, etc.).

- Verification of their progress in the conceptual field (questions in class, comments in the classroom, completion of exams, etc.).

- Periodic oral and/or written tests to assess the degree of knowledge acquired, as well as the qualities of expression, oral and written, that this educational level requires.

System of continuous evaluation.

Following the spirit of Bologna, in terms of the degree of involvement and continuous work of the student throughout the course, the evaluation of the subject contemplates the system of continuous evaluation as the most appropriate to be in line with the guidelines set by the new framework of the EEES.

The evaluation criteria to be followed for the activities of the continuous evaluation system are

- Individual activities in class: The presentation and discussion of two works, in class and directed to their peers. This activity is valued from 0 to 10 points. (minimum score 5).

- Exercises, theoretical questions and proposed works: The teacher will propose exercises, problems, practical cases, theoretical questions, etc. to be solved individually.

This activity will be given in time and form and will be valued between 0 and 10 points.

- Written evaluation tests: These will consist of the typical written test scored from 0 to 10 points. The final mark for this activity will be given by the arithmetic average of these tests, provided that there is no unit mark below 3 points, in which case the activity will be failed.

As a summary of the above, the following table has been designed for the weighting process of the different activities in which the process of continuous evaluation of the course has been structured.

Evaluation activity	Weighting
Individual activities in class	10%
Individual practices	40%
Written assessment tests	50%

Prior to the first official call, the teacher will notify each student whether or not he or she has passed the course according to the continuous evaluation system, based on the sum of the scores obtained in the different activities carried out throughout the course.

In case of not passing in this way, the student will have two additional calls to do it (global test of evaluation), on the other hand the student who has passed the subject by means of the system of continuous evaluation, will also be able to choose the final evaluation, in first call, to raise marks but never to lower them.

To be eligible for the Continuous evaluation system, students must attend at least 80% of the classroom activities (practicum, practical training, etc.).

Comprehensive final evaluation test.

The student must opt for this modality when, due to his/her personal situation, he/she cannot adapt to the rhythm of work required in the continuous evaluation system, has failed or would like to raise his/her grade having participated in the evaluation methodology.

As in the system of continuous evaluation, the overall final assessment test must aim to check whether the learning results have been achieved, as well as to contribute to the acquisition of the various skills, and must be carried out through more objective activities if possible.

The comprehensive final assessment test will have the following group of qualifying activities:

- Project: The student will delivery a flood study with countermeasures at the beginning of the global evaluation test, as a sine qua non condition to pass the course. The student will answer in writing to the questions asked by the teacher. Valuing this activity from 0 to 10 points. A minimum of 5 points is required to pass the course.

- Written exam: It will consist of a test that will contain questions and problems related to the topics explained throughout the course.

This test will be valued from 0 to 10 points.

As a summary of the above, the following table has been designed to evaluate the different activities in which the final evaluation process of the course has been structured.

Evaluation activity	Weighting
Projects	30%
Written test	70%

The course will have been passed on the basis of the sum of the scores obtained in the different activities carried out.

For those students who have failed the continuous evaluation system, but some of their activities, with the exception of the written evaluation tests, have been carried out, they will be able to promote them to the global final evaluation test, in which case they will only have to take the written test.

All the activities covered by the overall final evaluation test, with the exception of the written examination, may be promoted

to the next official convocation, within the same academic year.

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 lectures, practice sessions, laboratory sessions, tutorials, and autonomous work and study.

A strong interaction between the teacher/student is promoted. 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.

If due to health reasons the in-person teaching-learning process is not possible, it shall be carried out telematically.

4.2.Learning tasks

This course is organized as follows:

- **Lectures**. Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the course are displayed, highlighting the fundamentals, structuring them in topics and or sections, interrelating them.
- **Practice sessions**: 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 sessions**. Project Development Support Classes: 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. The students will develop real-world projects using the concepts learned in the theory and practical classes
- **Tutorials**: Carried out giving individual, personalized attention with a teacher from the department, these tutorials may be on-site or online.
- **Autonomous work and study**
    - Study and understanding of the theory taught in the lectures.
    - Understanding and assimilation of the problems and practical cases solved in the practice sessions.
    - Preparation of seminars, solutions to proposed problems, etc.
    - Preparation of real-world projects.
    - Preparation of the written tests for continuous assessment and final exams.

The course has 6 ECTS credits, which represents 150 hours of student work in the subject during the term, 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 course file in the Accreditation Report of the degree, taking into account the level of experimentation considered for this course is moderate.

Activity	**Weekly school hours**
Lectures	3
Laboratory sessions	1
Other Activities	6

Nevertheless, the previous table can be shown in 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 Project Development Support Classes (supervised practice sessions), 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 2nd semester.

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

4.3.Syllabus

This course will address the following topics:

- Topic 1. Introduction and general concepts
- Topic 2. River Hydraulics
- Topic 3. River Morphology
- Topic 4. Introduction to River Works
- Topic 5. Hydraulic modelling in rivers

4.4.Course planning and calendar

The list below shows the contents of each week. They are consistent with the Topics of the course (The order could be modified in case of changes in the university calendar)

- Week 1: Topic 1. Introduction and general concepts
- Week 2: Topic 1. Introduction and general concepts
- Week 3: Topic 2. River Hydraulics
- Week 4: Topic 2. River Hydraulics
- Week 5: Topic 3. River Morphology
- Week 6: Topic 3. River Morphology
- Week 7: Topic 3. River Morphology
- Week 8: Topic 4. Introduction to River Works
- Week 9: Topic 4. Introduction to River Works
- Week 10: Topic 4. Introduction to River Works
- Week 11: Topic 4. Introduction to River Works
- Week 12: Topic 5. Hydraulic modelling in rivers
- Week 13: Topic 5. Hydraulic modelling in rivers
- Week 14: Topic 5. Hydraulic modelling in rivers
- Week 15: Topic 5. Hydraulic modelling in rivers

Further information concerning the timetable, classroom, office hours, assessment dates (http://eupla.unizar.es/asuntos-academicos/examenes) and other details regarding this course will be provided on the first day of class or please refer to the Faculty of EUPLA website and Moodle.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28757&year=2020