

30153 - Reinforced and Prestressed Concrete

Syllabus Information

Academic Year: 2020/21

Subject: 30153 - Reinforced and Prestressed Concrete

Faculty / School: 179 - Centro Universitario de la Defensa - Zaragoza

Degree: 457 - Bachelor's Degree in Industrial Organisational Engineering
563 - Bachelor's Degree in Industrial Organisational Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject Type: Optional

Module: ---

1.General information

1.1.Aims of the course

- Ability to understand the mechanisms load transmission of structures.
- To know the concrete dosification and the influence on its behaviour and its durability.
- To understand the concrete, steel and reinforced concrete behaviour.
- To learn to design, calculate and check of reinforced concrete structures according to the Spanish rule.
- Knowledge to execution of concrete structures.

1.2.Context and importance of this course in the degree

The subject is included in the Structures and Materials specialty of IOI, together with 'Steel Structures' and the 'Structural Calculation' subjects. It's a fundamental subject in the in the training of Engineers Arm of the Earth Army. Previously, the student has studied the 'strength of materials' subject, which lays the bases for understand the equations to define the behaviour of structures against external stresses. Also knowledge learned in the 'General Construction Procedures' subject is used.

1.3.Recommendations to take this course

Its a Structures and Materials specialty of IOI included in the 4^o course. Its recommended have approved the 'Strength of Materials' subject. It's necessary to be enrolled the 'Structural Calculation' subject.

2.Learning goals

2.1.Competences

When the student approve the subject, he will be able to:

- Ability to plan, budget, organise, manage and monitor tasks, people and resources. (C2)
- Ability to solve problems and take decisions with initiative, creativity and critical reasoning. (C4)
- Ability to communicate knowledge and skills in Spanish (C6)
- Ability to work in a multidisciplinary group and in a multilingual setting (C9)
- Ability to continue learning and develop self-learning strategies (C11)
- Knowledge of the theoretical and technological specifications involved in projecting and calculating reinforced concrete and pre-stressed structures in conditions that ensure safety (C59)
- Gaining the necessary competence to calculate elementary architectural constructions (C60)

2.2.Learning goals

To approve the subject, the student must demonstrate the following goals...

- To select the adequate concrete according to the use and the durability conditions of the structure. Know how to calculate the concrete dosification.
- To understand the different mechanisms load transmission according to different structural typologies.
- Apply correctly theoretical structural models to analyze real problems.
- To define qualitatively, the resistant response mechanisms that occur in reinforced concrete structures against different types of stress.
- To design, calculate, project and execute reinforced concrete structures according to the Spanish rule under safety, functionality and durability conditions
- To describe in a basic way the behavior of precast concrete structures.
- To develop constructive details of the principal structural typologies, including prefabricated concrete.
- To describe in a general way the characteristics of other special concrete typologies and its applications.
- To select, design and calculate foundations according to the structure and the soil typology

2.3.Importance of learning goals

The learning goals are part of the competences that students must acquire as part of their training in their fundamental specialty. The ability to design the most appropriate structural solution for each project design, needs and uses, is a fundamental competence of an engineer.

3.Assessment (1st and 2nd call)

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

The subject can be approved by continuous assessment or final exam.

The assignments to realize in the continuous assessment are:

La nota mínima de la evaluación total de pruebas teóricas y de las prácticas será en ambos casos de 4.

Las pruebas escritas supondrán el 60% de la nota final.

Los trabajos sumarán el 10% de la nota.

El trabajo final de prácticas con CYPE sumará otro 20% de la nota.

La exposición en inglés del trabajo de prácticas con CYPE sumará el 10% de la nota final.

En cada prueba parcial y trabajo el alumno deberá obtenerse una nota mínima de 3,5.

Se tendrá en consideración la evolución de la adquisición de conocimientos a lo largo del curso, así como la participación activa en clase y la calidad de las exposiciones y trabajos.

- Midterm exams about theoretical and practical aspects.
- Coursework
- Course dissertation: Design and calculate of a real structure with Cype Ingenieros program, according to the requirements of the Building Technical Code. The results will be presented in English.

The minimum mark of the total evaluation of the exams and the work-practices will be in both cases 4.

The midterm exams will suppose 60% of the final mark.

The coursework will suppose 10% of the final mark.

The course dissertation will suppose 20% of the final mark and the exposure of results in English the other 10%.

In each midterm exam and coursework the student must obtain a minimum mark of 3,5.

The evolution of the acquisition of knowledge throughout the course will be taken into consideration, as well as the active participation in class and the quality of the works.

Students who do not pass the subject by continuous assessment should make a final exam.

4.Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

If this teaching could not be done in person for health reasons, it would be done telematically

It is a continuous learning process where the student plays an important participatory role.

Different methodologies are alternated along the course and complement each other: Participatory theory classes, case studies, computer practices, visit work and oral presentation. The participation in their own training is encouraged through the Moodle platform.

4.2. Learning tasks

The learning activities will be:

1. Participatory lectures. Consisting in exhibition of concepts and theoretical developments of the subject, always accompanied by real examples that help understanding thereof. The student will participate in the reasoning and deduction of the concepts, to reinforce learning a theoretical and practical way. Photographs of various works will be shown to the student to visualize the whole construction process.
2. Case-studies. Different section and reinforcement designs of various resistant elements, with the full calculation of these will be studied. Students will learn to resolve from start to finish the main structural typologies that will find in their professional activity.
3. Computer practices: will be taught the handling of the software for structures calculating most habitual in the engineer profession: CYPE. Along with various practical computer sessions, they will introduce a complete reinforced concrete edification, obtaining the necessary datas for the realization of the final work of the course.
4. Visit a work: Students will visit a reinforced concrete work when it is in the placement process of reinforcement in slabs, to understand which elements composes the different parts of the structure and how they work in situ. Will show them the plans used for construction and its interpretation will explain.
5. Oral presentations: The students will make an oral presentation of 10 minutes about the results of his final work in English
6. Moodle interactive platform: the student will be encouraged to put up videos, photographs and interesting facts about the topics covered in class, to share thereof with the other students. Discussion forums to resolve doubts are created by the professor or among them.
7. Tutorials in which the student is helped to resolve the doubts raised during learning.

4.3. Syllabus

The program that the student is offered to help achieve the expected results is

- 1 Concrete dosification and properties. Constituents
- 2 Reinforced concrete. Behavior.
- 3 Calculation bases. Deformation domains.
- 4 Limit states and verifications:
 - Normal stress~resultants
 - Tangential stress~resultants
- 5 Reinforcement. Disposition, overlaps and anchors
- 6 Working checks.
- 7 Shallow foundations.
- 8 Prefabricated concrete construction.
- 9 Behavior basis of prestressed concrete.
- 10 Execution of concrete structures.

4.4. Course planning and calendar

The available, class sessions will be distributed in theoretical sessions, taught by the teacher, computer practices and public presentations by students about topics related to the contents of the subject. To help achieve the necessary skills in English, these presentations will be held in English.

The evaluation of the subject will be based on several exams, evaluation of practices and public presentations.

In addition, students who don't pass such evaluation, two final exams will be held in official competitions.

If possible, a visit to work will be made. This activity is common to the three subjects of the module. Lectures given by invited staff can be scheduled too.

Key dates will be announced by the teacher, both in class and through the platform Moodle support.

4.5. Bibliography and recommended resources

Bibliography available in http://biblos.unizar.es/br/br_citas.php?codigo=30153&year=2020