Year : 2020/21

28715 - Structure Technology

Syllabus Information

Academic Year: 2020/21
Subject: 28715 - Structure Technology
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 423 - Bachelor's Degree in Civil Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

The general objective is to cultivate and accentuate the design and design aspects of the structures project. More specifically, we look for:

- Intuitive knowledge of resistant mechanisms. It is about the student learning to "feel" the resistant work of the simple pieces.

- Subject oriented basically towards the project, fostering in the student the mentality of the designer.

- Valuation of the good conception and of the successful design as indispensable conditions of a quality project.

- Acquisition of the global meaning of the structural calculation concept.

- Introduction of sectional sizing of the most common materials.

- Continuous references to the calculation of structures already known by students (Theory of structures), seeking mental connections between structural forms and organizations and resistant mechanisms that develop, on the one hand, and between resistant mechanisms and signs and types of efforts on the other.

1.2.Context and importance of this course in the degree

The subject of Technology of Structures, is part of the Degree in Civil Engineering taught by EUPLA, framed within the group of subjects that make up the module called Common Formation. It is a subject of the second course located in the fourth semester and mandatory (OB), with a teaching load of 6 ECTS credits.

This subject involves the acquisition by the student of certain specific basic competences of the degree, in addition to providing additional useful training in the performance of civil engineering functions related to the field of structures.

The need of the subject within the curriculum of the present degree is more than justified and it is understood that the ideal would be that, as a student, this subject will be started with clear ideas regarding the knowledge of statics, mathematics , physics, and theory of structures, previous knowledge acquired in previous subjects.

1.3.Recommendations to take this course

Although it is not required to have passed the subjects of Mathematics, Physics and Mechanics of the first year, it is highly recommended to have acquired skills in the application of the basic concepts of them. Equally, the use of the subject Theory of Structures is very advisable. The student, before starting this course, should be able to:

Understand the concept of function and know how to work with polynomials and trigonometric functions.

Solve a linear system with different numbers of unknowns.

Solve a polynomial equation of "n" degrees.

Handle basic notions of vector and matrix calculation.

Derive and integrate polynomial functions.

Derive and integrate trigonometric functions.

Make changes of units freely.

Project vectors in two and three dimensional systems.

Calculate the module of a vector.

Apply the equations of the statics to obtain one or more unknown forces.

Calculate simple articulated lattices.

Calculate stress laws of simple biapoyed beams.

Calculate stress laws of beams, gantries and isostatic and hyperstatic arcs.

2.Learning goals

2.1.Competences

Upon passing the course, the student will be more qualified to ...

Generic capacities

C04. Ability to analyze and understand how the characteristics of structures influence their behavior. Ability to apply knowledge

C06. Knowledge of the fundamentals of behavior of reinforced concrete structures and metal structures and ability to conceive,

G01. Organization and planning.
G02. Solve problems.
G03. Take decisions.
G04. Oral and written communication.
G05. Analysis and synthesis.
G06. Information management.
G07. Teamwork.
G08. Critical thinking.
G09. Multidisciplinary teamwork.
G10. Work in an international context.
G11. Adapt to new situations.
G12. Leadership aptitude.
G13. Adapt to social and technological innovations.
G14. Reason and present their own ideas.
G15. Communicate with words and pictures.
G16. Search, analyze and select information.
G17. Self-learning.
G18. Understand advanced aspects of the study área.
G19. Apply their knowledge in solving problems and think out arguments in the study area.
G20. Search and interpret data, analyze and think about relevant topics.
G21. Transmit information and ideas to all kinds of public.
G22. Acquire learning techniques to expand their studies later.
G23. Respect fundamental rights, gender equality, accessibility for disabled people and respect the values of democracy and peace
G24. Promote entrepreneurship.
G25. Knowledge in information and communication technologies.

2.2.Learning goals

The student, to pass this subject, must demonstrate the following results ... You will have an intuitive understanding of resistant mechanisms. The student will know how to ?feel? the resistant work of the simple pieces. You will obtain a mentality of structural designer, since the subject is basically oriented towards the project. You will know how to value a good conception and the correct design as essential conditions to achieve a quality project. It will have perspective of the sense of the structural calculation. You will achieve a greater command of the calculation of structures (Theory of structures) but explaining the mental connections between forms and structural organizations and resistant mechanisms that develop, on the one hand, and between resistant mechanisms and signs and types of efforts on the other. The basic principles of dimensioning structural and metal concrete sections will be acquired.

2.3.Importance of learning goals

This subject has a marked practical nature, that is, it offers training with content for application and immediate development in the labor and professional market.

Through the achievement of the relevant learning results, the necessary capacity is obtained to understand the functioning and structural dimensioning, which will be absolutely essential for the student's training, and essential to overcome the rest of the degree subjects related to structures.

A structural project comprises three phases: design, analysis and dimensioning. In the specific case of this subject it is intended that the student obtain an optimal level of the second phase, the analysis and be able to understand the basic concepts inherent in the third phase, that is to say, the dimensioning. Subsequently, in subsequent subjects such as precast engineering, foundations and expansion of structures, the concepts introduced will be expanded and developed.

3.Assessment (1st and 2nd call)

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

The student must demonstrate that they have achieved the expected learning outcomes through the following assessment activities:

Continuous assessment

Throughout the course there will be several mandatory exercises. Its value is 30% of the total course. The teacher will propose the practical exercises, which the students must do during the determined time. Students will deliver the practice on the date scheduled for their evaluation. Once delivered, the practice will be resolved in class.

The continuous assessment will be completed with a theoretical-practical test whose value is 70% of the total of the course.

Students whose average mark is equal to or greater than 5.0 points will pass the course in continuous assessment.

It will also be necessary to have attended 80% of the face-to-face activities.

Final assessment

Students who do not pass the course in continuous assessment will have to take a theoretical-practical final test, which will be scored from 0 to 10 and it will be necessary to obtain a minimum score of 5 points to pass the course.

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, 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.

The current course Tecnología de Estructuras, is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each topic, the problem-solving or resolution of questions and laboratory work, at the same time supported by other activities.

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**: The theoretical concepts of the course are explained and illustrative examples are developed as a support to the theory when necessary.
- **Practice sessions**: 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.
- **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 laboratory workshops, preparation of summaries and reports.
    - Preparation of the written tests for continuous assessment and final exams.

This course has 6 ECTS credits, which represents 150 hours of student work in the course 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 hours**
Lectures	3
Laboratory sessions	1

Other Activities	6

4.3.Syllabus

This course will address the following topics:

Topic 1	SAFETY CRITERIA. THEORY OF THE CONDITIONS LIMITS
Topic 2	CHARACTERISTICS OF THE MATERIALS. CONCRETE AND STEEL
Topic 3	CALCULATION OF SECTION FOR THE CLASSIC METHOD. MAXIMUM MOMENT. CALCULATION OF SECTIONS IN DEPLETION
Topic 4	BASIC HYPOTHESES ON THE LAST LIMIT STATES. GRAPH OF PIVOTS
Topic 5	FLEXION CALCULATION. BENDING FLEXION CALCULATION
Topic 6	SHEAR FORCE
Topic 7	ANALYSES OF THE BUCKLING
Topic 8	TWIST
Topic 9	LIMITED STATES OF SERVICE. FISURATION. DEFORMATIONS
Topic 10	ASSEMBLY OF REINFORCED CONCRETE ELEMENTS.
Topic 11	ASSEMBLY OF REINFORCED CONCRETE ELEMENTS
Topic 12	UNIDIRECTIONAL WROUGHT OF REINFORCED CONCRETE
Topic 13	ASSEMBLY OF METAL ELEMENTS
Topic 14	ASSEMBLY OF METAL ELEMENTS
Topic 15	ASSEMBLY OF METAL ELEMENTS

4.4.Course planning and calendar

Every term has 15 weeks that adjust to the agenda.
The continuous assessment takes a calendar of activities that will be respected.
Continuous assessment activities are done after finishing each topic.

Calendar of evaluation.

Name	**Start**	**Deadline**	**Resolution**	**Grades**
Practice 1	3 week	4 week	4 week	5 week
Practice 2	7 week	8 week	8 week	9 week
Practice 3	12 week	13 week	13 week	14 week
(1st call)				
(2nd call)				

Further information concerning the timetable, classroom, office hours, assessment dates 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=28715&year=2020