Universidad Zaragoza

Year : 2020/21

30715 - Structures 1

Syllabus Information

Academic Year: 2020/21
Subject: 30715 - Structures 1
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 470 - Bachelor's Degree in Architecture Studies
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

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 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, autonomous work and study, tutorials, and exams.

The learning process that has been designed for this course has been planned to provide the students with constant and active learning. In the lecture room the theoretical aspects will be unveiled with the help of examples and exercises, which motivate the use of the different procedures seen in class. The proposed methodology aims at encouraging students for daily work.

4.2.Learning tasks

This course is organized as follows:

- **Lecture** (30 hours). The teacher will expose the basic fundamental concepts needed for the development of the course objectives in the lecture room.
- **Practice sessions.** (15 hours). The main objective of these sessions is to learn and consolidate the theoretical techniques previously seen in the lecture. These sessions are carried out in the lecture room.
- **Lab.** (15 hours). The main objective of these sessions is to learn and practice the use of specific software for the solution of differential equations problems in order to consolidate the theoretical techniques previously seen in the lecture.

- **A05 Autonomous work and study.** The student has to solve a structural engineering problem using the learned techniques.
- **A06: Tutorials.** The students can receive personal assistance by the teachers to review and/or discuss the topics presented in class.
- **A08: Exams**. The evaluation process is based on a set of written tests and reports that the student has to do along the course. More details are described in point 3 of this guide.

4.3.Syllabus

This course will address the following topics:

Section I: Theory of Elasticity

1. Introduction to Solid Mechanics: Linear Elasticity.
2. Kinematics of deformable solids.
3. Dynamics of deformable solids.
4. Symmetric tensors (order 2) representation.
5. Constitutive laws. Plasticity criteria.

Section II: Strength of Materials.

1. Tensile and compressive strength. Wires and membranes.
2. Arcs, vaults, and cupulas.
3. Structures subjected to bending. Beams.
4. Beams subjected to torsion.

4.4.Course planning and calendar

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 College of Higher Engineering and Architecture (EINA) website (https://eina.unizar.es/) and Moodle.

4.5.Bibliography and recommended resources

1. Elías Cueto, David González. Apuntes de la asignatura Estructuras I. Anillo digital docente de la Universidad de Zaragoza, 2016.
2. Federico París. Teoría de la Elasticidad. Universidad de Sevilla. 1998. ISBN: 84-88783-32-9.
3. J. A. Garrido y A. Foces. Resistencia de Materiales. Secretariado de Publicaciones e Intercambio Científico de la Universidad de Valladolid. Valladolid, 1999.
4. Aurelio Muttoni. L'art des structures. Une introduction au fonctionnement des structures en architecture . Presses Politechniques et Universitaires Romandes. ETH Zurich, 2005. Existe una edición en italiano, editada por Mendrisio Academy Press.
5. An Introduction to Structural Mechanics for Architects, Elías Cueto and David González, Springer (2018)
6. Resistencia de Materiales para Arquitectos. David González y Elías Cueto. Prensas de la Universidad de Zaragoza (2017)