

29722 - Mechanics of Deformable Solids

Syllabus Information

Academic Year: 2019/20

Subject: 29722 - Mechanics of Deformable Solids

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 434 - Bachelor's Degree in Mechanical Engineering

ECTS: 6.0

Year: 3

Semester: First 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. It is based on the participation and the active role of the student to favour the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via web-based Moodle platform. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures: 45 hours.
- Four computer lab session: 12 hours.
- One laboratory session: 3 hours.
- Guided assignments: 22 hours.
- Autonomous work: 63 hours

- Tutorials: Optional.

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks (5 sessions in total) and the last 3 hours each.

Guided assignments: students will complete two assignments related to concepts seen in laboratory sessions and lectures, one of the first part Linear Continuum Mechanics and other related to the second part of the subject Finite Elements. They will be submitted at fixed dates through Moodle.

Autonomous work: students are expected to spend about 63 hours to study theory, solve problems and prepare lab sessions.

Tutorials: the professor's office hours will be posted on Moodle and on the website of the degree to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

4.3.Syllabus

The course will address the following topics:

Section I: Continuum Mechanics

1. Introduction to Linear Continuum Mechanics
2. Strain
3. Stress
4. Principal strains and stresses.
5. Constitutive equations.
6. Differential formulation of the elasticity problem
7. Limits of elastic behaviour.

Section II: Finite Element Method (FEM) in Continuum Mechanics

8. Introduction to FEM
9. FEM formulation in one dimension
10. FEM formulation in two-dimensional elasticity (plane strain and plane strain)
11. Formulation FEM formulation in three dimensions
12. User recommendations in MEF

4.4.Course planning and calendar

The course calendar is defined by the Escuela de Ingenierí-a y Arquitectura.

4.5.Bibliography and recommended resources