Universidad Zaragoza

Year : 2019/20

28707 - Mechanics

Syllabus Information

Academic Year: 2019/20
Subject: 28707 - Mechanics
Faculty / School: 175 -

Degree: 423 - Bachelor's Degree in Civil Engineering

ECTS: 6.0
Year: 1
Semester: Second semester
Subject Type: Basic Education
Module:

1.General information

1.1.Aims of the course

The foreseen outcomes of this signature are based on the following approaches and objectives:

- Comprehension of the concepts and fundamental laws that rule the Structural Analysis: Statics, recognizing and understanding their right use in different problems found in the Civil Engineering and Architecture.
- Analysis of problems that make up the different aspects of the Structural Analysis: Statics, recognizing the multiple Physics foundations underlying technical implementations, devices and real systems.
- Comprehension of the units of measurements and order of magnitude of the physical magnitudes in use, implementing them in problem solving related to aspects of Engineering and Architecture and using the right numerical values with the right units of measurements.
- Correct use of the basic mathematical methods and reasoning for experimental measurements and simulations processing, expressing and interpreting the gathered data and relating them to their appropriate magnitudes and underlying physical laws.
- Correct use of the bibliography available with a critic mind and focus, using a technical language with clear ideas and concepts in order to explain and debate about issues of the underlying statics and knowledges related to it.
- Correct implementation and use of the multiple equations provided by the Physics under study to fields such as the Civil Engineering and the Architecture.
- Comprehension of the meaning, right use and relationship among the multiple physical magnitudes in use.
- Capability to understand and describe the different type of structures based on the various supports and connections used for two and three dimensional structures, stability conditions, equilibrium and elements among others.

1.2.Context and importance of this course in the degree

Those students enrolled in this subject are going to be very well prepared to face and overcome with success and academic progress the subjects of Structural Analysis and Strength of Materials, given in the following years of this academic degree, and also to implement it to different areas in the Civil Engineering, the Architecture and their professional development.

1.3.Recommendations to take this course

It is advisable for the students to have a good knowledge in General Mechanics, especially in Statics of rigid bodies and fluids, and Mathematics, especially in Linear Algebra, Vector Calculus and Integral and Differential Calculus. Those students enrolled in this subject should have passed with success the subjects related to Physics I and Mathematics I given in the first semester and first course of this academic degree.

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 learning process designed for this subject is based on the following:

Strong interaction between the teacher and the student. 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 subject "Mecánica" is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities.

The organization of teaching will be carried out using the following steps:

- **Theory Classes**: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- **Practical Classes**: 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 Workshop**: 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.
- **Individual Tutorials**: Those carried out giving individual, personalized attention with a teacher from the department. These tutorials may be in person or online.

Regarding to the slides, proposed exercise photocopies, laboratory session guides and other materials used in class, all of them are going to be available on the Moodle platforma of this subject.

Material	Format
Topic theory notes Topic problems	Paper/repository
Topic theory notes Topic presentations Topic problems Related links	Digital/Moodle E-mail
Educational software	Open source Maxima and Octave

4.2.Learning tasks

The programme offered to the student to help them achieve their target results is made up of the following activities:

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out; the activities are the following:

Face-to-face generic activities:

- **Theory Classes**: (2 ECTS: 20 h) The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
- **Practical Classes**: (2 ECTS: 20 h) Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- **Laboratory Workshop**: (1.75 ECTS: 17.5 h) This work is tutored by a teacher, in groups of no more than 20 students.

- **Seminar activities:** (0.25 ECTS: 2.5 h) It is tutored by teachers from other subjects of this degree with the purpose to show the students the different applications of Mechanics in Civil Engineering.

Generic non-class activities:

- Study and understanding of the theory taught in the lectures.
- Understanding and assimilation of the problems and practical cases solved in the practical classes.
- 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.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the semester, in other words, 90 h for autonomous work and 60 h for tutorials distributed among 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	Weekly school hours
Lectures	4
Laboratory workshop	2
Other activities	4

Nevertheless the previous table can be shown into greater detail, taking into account the following overall distribution:

- 54 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.
- 6 hours of written assessment tests, one hour per test.
- 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 needs a tutorial.

4.3.Syllabus

This course is required for all students in engineering and architecture. It will introduce the concepts and practice of Physics. The topics and tools presented here provide the foundation needed in any engineering course.

The main topics developed here are:

- Statics of particles
- System of forces and moment
- Equilibrium and reactions at supports and connections
- Friction
- Centroids and centres of gravity
- Distribuited forces
- Fluid statics
- Analysis of structures
- Forces in beams and cables
- Moments of inertia of area
- Elasticity

4.4.Course planning and calendar

Class hall sessions & work presentations timetable:

Class room and timetables are officially published at Calendario y horarios.

The dates of the final exams will be those that are officially published at Exámenes.

The written assessment tests will be related to the following topics:

- **Test 1**: Statics of particles, System of forces and moment, Equilibrium and reactions at supports and connections, Friction.
- **Test 2**: Centroids and centres of gravity, Distribuited forces, Fluid statics, Analysis of structures.
- **Test 3**: Forces in beams and cables, Moments of inertia of area, Elasticity.

Estimated timetable of lectures

Week	Topic	Theme
1 2	I	Statics of particles
3 4	II	System of forces and moment
5 6	III	Equilibrium and reactions at supports and connections, friction
7 8	IV	Centroids and centres of gravity, distributed forces and fluid statics
9 10	V	Analysis of structures
11 12	VI	Forces in beams and cables
13 14 15	VII	Moment of inertia of area and elasticity

Important dates, such as work presentations, laboratory practices, written exams, among other foreseen acitivities will be communicated to the students in the class room or through the Moodle platform a long time in advance.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28707&year=2019