

29811 - Mechanics

Syllabus Information

Academic year: 2023/24

Subject: 29811 - Mechanics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
326 - Escuela Universitaria Politécnica de Teruel

Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering
444 - Bachelor's Degree in Electronic and Automatic Engineering

ECTS: 6.0

Year: 2

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The goal of the subject Mechanics is to train students in the approach and resolution of the kinematics and dynamics of mechanical systems. Specifically, the student must be able to model a 3D mechanical system, define its parameters of motion, define the kinematics, the actions present indicating those that constitute an unknown of the dynamic problem and, finally, propose the mathematical model that would allow its resolution.

Knowledge of Physics I (basic physical units and quantities), Mathematics I and II (vector algebra, matrices, trigonometry and basic differential calculus) and Graphic Expression (spatial vision) is required, trigonometry and basic differential calculus) and Graphic Expression (spatial vision).

This objective is aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, such that the acquisition of the learning results of the subject will contribute, to some extent, to the achievement of targets 9.4 and 9.5 of Goal 9.

2. Learning results

- To know the composition of movements applied to mechanical systems.
- To know how to define and identify the motion parameters of a mechanical system and its degrees of freedom.
- To understand and apply the forces generated in the interaction between solids and mechanical systems.
- To understand and apply the concepts of center of mass and inertia tensor to mechanical systems.
- Apply vector theorems to mechanical systems and interpret the results obtained.
- To know the kinematics and dynamics of robots.
- Apply the mechanical characteristics of electric, pneumatic and hydraulic drives.
- To know and apply computer programs for modeling mechanical systems.

3. Syllabus

The program is structured as follows:

- Kinematics of the material point.
- Vector bases and orientation.
- Composition of movements.
- Kinematics of the rigid solid.
- Slip-free rolling.
- Motion parameters of a mechanical system.
- Flat movement.
- Forces.
- Mass geometry.
- Vector formulation of the dynamic problem.
- 2D Energy Theorem.

4. Academic activities

- Theoretical class (30 hours): The theoretical basis of mechanical systems will be presented and illustrated with real examples.
- Problem classes and case resolution (15 hours): Problems and cases will be developed, coordinated at all times with the theoretical contents, encouraging student participation.

- Laboratory practices (15 hours): They will be developed in small groups, where the student will learn about different mechanisms and mechanical systems, as well as computer programs for working with mechanisms.
- Teaching assignments (30 hours): Work will be proposed to deepen in the different concepts seen in the subject.
- Study (55 hours).
- Assessment tests (5 hours).

5. Assessment system

Continuous assessment through activities:

- Subject work (15% of the grade): An assignment will be developed. Its assessment will be based on the report submitted.
- Practices (10% of the grade, minimum grade of 4 out of 10): Practice sessions with delivery of final report. If the minimum grade is not reached, this part may be evaluated through the practice exam of the global assessment.
- Partial assessment test (15% of the grade): Written test, carried out in the middle of the subject, consisting of questions and problems of the first part of the term (kinematics). If this test is not taken or is not passed, will be able to demonstrate its learning in the final exam of the continuous assessment or in the official calls.
- Final exam (60% of the grade or 75% if the first continuous assessment test was not passed, minimum grade of 4.5 out of 10): The complete content of the subject will be evaluated by means of theoretical-practical questions and problems. will be carried out on the dates determined for continuous assessment (EINA) or the last week of class (EUPT).

In order to allow a global assessment of the subject, the following tests will be taken in the two official exams (if the Practicals and the Assignments have been passed in the teaching period, only the final exam must be taken:

- Final exam (75% of the grade, minimum grade of 4.5 out of 10): The complete content of the subject will be evaluated by means of theoretical-practical questions and problems.
- Practical exam (10% of the grade): It will consist of questions related to the activities of the practical sessions.
- Submission of the course work (15%).