

29916 - Mechanics

Syllabus Information

Academic year: 2023/24

Subject: 29916 - Mechanics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 2

Semester: Second 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**. Thus, the ability to model a mechanical system will be developed, considering its **parameters of movement** and its kinematics, as well as the present **actions** and those that constitute an unknown of the dynamic problem. Finally, the mathematical model for the simulation of the movement must be proposed.

Previous knowledge in **Physics I**, **Mathematics I**, **Mathematics II** and **Graphic Expression** is recommended for this subject.

These approaches and goals are aligned with the following **Sustainable Development Goals (SDGs)** of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to its achievement: **Goal 3 (Objective 3.6)**, **Goal 7 (Objective 7.3)** and **Goal 9 (Objective 9.4 and 9.5)**.

2. Learning results

In order to pass this subject, **students must demonstrate the following results:**

Modeling of mechanical systems by means of **schematization** and **definition of variables**.

Knowledge of **motion composition** applied to mechanical systems.

To know how to define and identify the **motion parameters and degrees of freedom** of a mechanical system.

Understanding and application of the **forces** generated in the **interaction between solids**.

Understanding and application to mechanical systems of the concepts of **center of masses** and **inertia tensor**.

Application of **vector theorems** to mechanical systems and interpretation of results.

Application of the **mechanical characteristics** of electric, pneumatic and hydraulic **drives**.

Knowledge and application of **mechanical systems modeling software**.

3. Syllabus

CINEMATICS

1. Kinematics of the material point.
2. Vector bases and orientation.
3. Composition of movements.
4. Kinematics of the rigid solid.
5. Slip-free rolling.
6. Motion parameters.
7. Flat movement.

DYNAMICS

8. Active forces.
9. Passive or linking forces
10. Dynamics of the particle.
11. Mass geometry.
12. Vector Theorems
13. Theorem of the Energy.

4. Academic activities

In order to cover the subject syllabus and help students achieve the intended learning results, the following activities are offered :

CLASS WORK:

- 1) **Master class** (type T1) (30 hours).
- 2) **Problem classes** (T2 type) (15 hours).
- 3) **Laboratory practicals** (type T3) (15 hours).

PERSONAL WORK:

- 4) **Teaching assignments** (type T6) (25 hours).
- 5) **Study** (type T7) (60 hours).
- 6) **Assessment tests** (type T8) (5 hours).

5. Assessment system

The subject will be passed either through **Continuous Assessment (Assessment Type 1)**, or through the **Global Tests in Official Call (Assessment Type 2)**. Each type of assessment includes the activities indicated.

TYPE 1 ASSESSMENT.

- 1) **Group work** (15 % of the overall grade)

Choose between solving a collection of problems or carrying out a multidisciplinary project with Problem Based Learning methodology.

- 2) **Qualification of learning** in the **practice** sessions (15 % qualification)

- 3) **First Midterm Exam** (35 % grade)

The first midterm exam will be held on a date announced well in advance and will account for 35% of the grade. A **minimum grade of 4.5/10** must be obtained **to average** with the other grades.

- 4) **Second midterm Exam** (35 % grade)

The second midterm exam will be held in the time slot arranged by the Center for Continuous Assessment. A **minimum grade of 4.5/10** must be obtained to average with the rest of the evaluable activities.

TYPE 2 ASSESSMENT.

In the **two official calls**, the global assessment will be carried out with the following tests:

- 1) **Final test** (70% of the overall grade). **Minimum grade to average 4.5/10.**
- 2) **Examination of learning in practice sessions** (15% grade).
- 3) **Examination of short questions on group work problems** (15% grade).