

30011 - Mechanics

Syllabus Information

Academic year: 2024/25

Subject: 30011 - Mechanics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 436 - Bachelor's Degree in Industrial Engineering Technology

ECTS: 6.0

Year: 2

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The subject focuses on the development of a general methodology for the study of 3D and 2D motion of the rigid solid, and multibody systems. The analysis of the motion of a system consists of two parts, Kinematics and Dynamics, which, starting from simplified hypotheses, allow to establish the theoretical mathematical models representative of its motion with certain degree of approximation. This approach requires the student to visualize and mathematically describe the motion of the system under study by acquiring proficiency in the application of Newton-Euler theorems, while reinforcing skills in spatial vision, differential and integral calculus and linear algebra.

2. Learning results

- Identify the motion parameters of a mechanical system and determine its degrees of freedom.
- To know and apply strategies for modeling the motion of a mechanical system.
- Analyze and interpret theoretical results and experimental data on the motion of a mechanical system
- Solve dynamic problems and relate motion to causes through critical reasoning.
- Integrate the fundamental concepts of mechanics with previous knowledge of graphic expression in a real problem, mathematics and programming.
- Working as a team

3. Syllabus

1. Introduction
2. Review of mathematical and geometric concepts
3. Kinematic modeling of mechanical systems
4. Particle kinematics. Composition of movements
5. Rigid solid kinematics. Non-skid bearing
6. Planar kinematics. Application to mechanisms
7. Forces in Newtonian Rigid Solid Mechanics
8. Particle dynamics
9. Mass geometry. Center of inertia and inertia tensor
10. Vector theorems for rigid solid and multisolid systems
11. Vector dynamics applied to plane mechanisms

4. Academic activities

- Lectures (45 hours). The basic theoretical principles are explained and complemented with the resolution of practical cases and problems.
- Laboratory practices (15 hours) : The necessary didactic tools and equipment are used for the study of the movement of mechanical systems
- Supervised work (14 hours) : Work on the concepts on which the subject is based - Study and personal work: 70 h
- Assessment 6 h

This subject is English Language Friendly (ELF) in at least one group. The study and class material is available in English and

the teachers will attend office hours and prepare and evaluate students in English if they don't speak Spanish.

5. Assessment system

The final grade is the sum of the activities listed below, provided that the minimum grade indicated is reached, on the dates of the global calls. It consists of the following three tests:

- Exercise/s Kinematics. 4 points (minimum 1.6)
- Exercise/s Dynamics. 3.5 points (minimum 1.4)
- Multiple choice questions on the content of the subject. 2.5 points (minimum 1)

To meet the learning results, a key point is attendance and completion of all practical activities and work proposed during the term. Therefore, an alternative assessment of activities developed during the term, that replace, respectively, the kinematics exercise/s and multiple choice questions of the global evaluation is proposed, whereas the minimum points are reached:

- Exercise/s Kinematics. 4 points (minimum 1.6)
- Practical activities. 2.5 points (minimum 1)

6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure