Universidad Zaragoza

Academic Year/course: 2023/24

30011 - Mechanics

Syllabus Information

Academic year: 2023/24
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.

The student acquires competencies to contribute to the achievement of goals 7.3 and 9.5 corresponding respectively to the following goals Sustainable Development Goals 7 and 9 (SDGs) of the United Nations 2030 Agenda https://www.un.org/sustainabledevelopment/es/

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

5. Assessment system

There are two assessment options, CONTINUOUS and FINAL.

The final grade is the sum of the activities listed below in each option, provided that the minimum grade indicated is reached.

1. CONTINUOUS, implies attendance and completion of all practical activities and work proposed during the term.

It consists of the following assessment activities:

a) Assessent of activities developed during the term.

a.1 Between 2 and 5 activities. 2.5 points (minimum 1). The grade obtained is maintained in both global calls, provided that the minimum grade is reached.

a.2 Exercise/s Kinematics. 4 points (minimum 1.6)

b) Exercise/s Dynamics. 3.5 points (minimum 1.4), on the date of the first global call for applications

2. FINAL, on the dates of the global call. It consists of the following three tests:

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