Kinematics and Dynamics of Machines

Academic Year: (2022 / 2023) **Review date: 16-01-2023**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: RUBIO ALONSO, HIGINIO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Machine Mechanics
Engineering Graphics

OBJECTIVES

Kinematic and dynamic analysis of complex machines.
Predimensioning a machine according to the requirements and requests to which it will be subjected.
Analyze the behavior of the elements in rotation and/or translation.
Analyze the kinematic and dynamic behavior of complex machines.
Modeling and simulating a machine (modeling and computer simulation techniques).

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Systematic study of the basic mechanisms. Types of friction. Analysis of lower-pair mechanisms. Bearings and others.
2.- Analysis and synthesis of cam machines.
3.- Study of geometry and analysis of gears. Spur gears.
4.- Gear trains and epicyclic gearsets.
5.- Study of geometry and analysis of gears.
  5.2.- Helical gears.
  5.2.- Bevel gears.
  5.3.- Worm gears.
6.- Mechanical regulation. Flywheel design.
7.- Shocks and percussions in mechanical systems.
8.- Analytical mechanics applied to mechanisms.
9.- Special mechanisms and transmissions, flexible springs, leaf springs, belts, cables and chains...

LEARNING ACTIVITIES AND METHODOLOGY

Lectures, classroom exercises and laboratories (4).
Project: Make a computer application that calculates some mechanical element, written memory and presentation in class.
Project: Carry out a computer application on a mechanical element, written report and presentation to the class.
Other teaching materials: Recommended books, Selection of solved problems and Additional Notes.
Personalized tutorials: individual and in small groups.

ASSESSMENT SYSTEM

- Individually score the work done by the student during the course (20%).
- Performing a group project, on the mechanical system of the subject (20%).
- Labs evaluation (10%).
- Final exam (50%).

If the continuous evaluation is right, the student can totally or partially release the subject that can be evaluated in the final exam.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- J.C. García-Prada, C. Castejón, H. Rubio, J. Meneses Problemas Resueltos de Teoría de Máquinas y Mecanismos, Paraninfo, 2014
- J.E. Shigley, J.J. Uicker Teoría de máquinas y mecanismos, McGraw-Hill, 1998

ADDITIONAL BIBLIOGRAPHY

- Artés, M. Mecánica, Editado por la U.N.E.D., 2010
- Baránov, G.G. Curso de Teoría de Máquinas y Mecanismos, Editorial MIR, 1985
- Henriot, G. Manual práctico de engranajes, Marcombo, 1967
- Jaime Domínguez Abascal (coord.) Teoría de máquinas y mecanismos, Editorial Universidad de Sevilla, 2016
- Lamadrid, A. y Corral, A. Cinemática y dinámica de máquinas, Publicado por ETSII de la UPM, 1992
- Litvin, F.L. & Fuentes, A. Gear Geometry and Applied Theory, Cambridge Universitary Press, 2004
- Mabie, H.H. & Reinholtz, Ch.F. Mecanismos y dinámica de maquinaria, Limusa, 1998
- Moliner, P.R.; Martell,J. y Rodríguez, A. Elementos de Máquinas, Ed. U.N.E.D., 1976
- Niemann, G. Tratado teórico-práctico de Elementos de Máquinas, Ed. Labor, 1973
- Norton, R.L. Diseño de maquinaria, McGraw Hill, 2009
- Simón, A.; Bataller, A.; Guerra, A.J.; Ortiz, A. y Cabrera, J.A. Fundamentos de Teoría de Máquinas, Bellisco, 2000