28811 - Mechanical Engineering

Información del Plan Docente

Academic Year	2017/18
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronic Engineering
ECTS	6.0
Year	2
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

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The current subject (Mechanical Engineering) is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities

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The organization of teaching will be carried out using the following steps:

— **Theory Classes** : Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.

— **Practical Classes** : The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.

_ **Laboratory Workshop:** Practical activities will be conducted in the computer room 1.1 software mechanism (GIM 16.0) with the presence and teacher mentoring **.**

— **Individual Tutorials** : Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online

5.2.Learning tasks

Programmed learning activities	The programme offered to the student to help them achieve their target results is made up of the following activities... Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following: — **Face-to-face generic activities** : ● **Theory Classes** : The theoretical concepts of the subject are explained and illustrative examples are developed as

	support to the theory when necessary. ● **Practical Classes** : Problems and practical cases are carried out, complementary to the theoretical concepts studied. ● **Laboratory Workshop** : This work is tutored by a teacher, in groups of no more than 20 students. — **Generic non-class activities** : ● Study and understanding of the theory taught in the lectures. ● Understanding and assimilation of the problems and practical cases solved in the practical classes. ● Preparation of seminars, solutions to proposed problems, etc. ● Preparation of laboratory workshops, preparation of summaries and reports. ● Preparation of the written tests for continuous assessment and final exams. The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class. A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

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Activity	Weekly school hours
Lectures	3
Laboratory Workshop	1
Other Activities	6

5.3.Syllabus

Chapter 1: Structural Analysis of Mechanisms Plans

Introduction: Historical development of the theory of mechanisms and machines

* Terminology mechanisms

* Classifications of elements and kinematic pairs of a mechanism

* Mobility and Degrees of Freedom: Criteria Grübler

* Act Grashoff Theorem and Graphical Analysis

* Obtaining a mechanism kinematic scheme

Chapter 2: Kinematic Analysis of Mechanisms Plans

* Statement of the problem Kinematic

* Relative Movement Plano

* Relative Instant Center

* Determination of the instantaneous centers mechanism

* Theorem Aronhold -kennedy

* Calculation of speed of a mechanism analytically

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* Calculation of speed of a mechanism graphically

Chapter 3: Dynamic Analysis of Mechanisms Plans

* Dynamic Approach problem

* Calculation of acceleration of a mechanism analytically

* Calculation of acceleration of a mechanism graphically

* Forces of inertia mechanisms

* Balance mechanisms

Chapter 4: Kinematic Analysis of Gear and Gear Trains

* Gears: Gear Fundamental Law

* Classification of Gears

* Gear Trains

* Classification Gear Trains

* Applications: Differential of a vehicle

Chapter 5: Theory of Mechanical Vibrations

* Fundamental concepts in vibration

* Systems degree of freedom

* Free Vibrations in systems of one degree of freedom

* Vibrations systems forced a degree of freedom

* Resonance Phenomenon

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5.4.Course planning and calendar

weeks	WEEKLY PLANNING SEMESTER	
1ª 2ª	Topic 1	Exercise No. 1 Continuous Assessment
3ª 4ª 5ª 6ª	Topic 2	Exercise No. 2 Continuous Assessment 1st Practice with software GIM (Topic 1 and 2) 1st Written Test (Topic 1 and 2)
7ª 8ª 9ª	Topic 3	Exercise No. 3 Continuous Assessment 2nd Practice with software GIM (Topic 3) 2nd Written Test (Topic 3)

10ª 11ª 12ª	Topic 4	Exercise No. 4 Continuous Assessment 3rd Written Test (Topic 4)
13ª 14ª 15ª	Topic 5	Exercise No. 5 Continuous Assessment 4th Written Test (Topic 5)

5.5.Bibliography and recommended resources

Bibliography:

"THE UPDATED BIBLIOGRAPHY OF THE SUBJECT IS CONSULTED THROUGH THE LIBRARY'S WEB PAGE http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a

BB Boresi, Arthur P.. Ingeniería mecánica : estática / Arthur P. Boresi, Richard J. Schmidt ; [traducción, Hernán Pérez Castellanos] México : Thompson Learning, cop. 2001

BB Boresi, Arthur Peter. Ingeniería mecánica : dinámica / Arthur P. Boresi, Richard J. Schmidt ; [traducción y revisión técnica, José de la Cera Alonso] México : Thomson Learning, cop. 2001

BB Moliner, P.R.. Engranajes / P.R. Moliner . - [1a. ed., 4a. reimp.] Barcelona : [el autor], 1990|e(Barcelona :|fc.p.d.a., ETSIIB)

BB Santamarina Pol, Pastor.Vibraciones mecánicas en ingeniería / Pastor Santamarina Pol, Mª Cristina Santamarina Siurana. - 1ª edición Valencia : Universidad Politécnica de Valencia, 1998

BB Shigley, Joseph Edward. Teoría de máquinas y mecanismos / Joseph Edward Shigley, John Joseph Uicker, jr. México [etc.] : McGraw-Hill, cop. 1988 (imp. 1996)

BC Khamashta Shahin, Munir. Problemas de cinemática y dinámica de máquinas. Vol.1, Problemas resueltos de

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cinemática de mecanismos planos / Munir Khamashta, Lorenzo Alvarez, Ramón Capdevila Barcelona : Edicions de la Universitat Politècnica de Catalunya, 1986

BC Moliner, P. R.. 134 problemas de teoría de máquinas y mecanismos / P. R. Moliner . - 1a. ed 1981., 4a. reimpresión 1992 Barcelona : Editado por el autor, 1981 (imp. 1992)

Recommended resources:

Material	Format
Topic theory notes Topic problems	Paper/repository
Topic theory notes Topic presentations Topic problems Related links	Digital/Moodle E-Mail
Educational software GIM 16	Web page: http://www.ehu.eus/compmech/software/