28833 - Mechatronic Systems: Design and Maintenance

Información del Plan Docente

Academic Year	2016/17
Academic center	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronic Engineering
ECTS	6.0
Course	4
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process designed for this subject is based on the following:

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 design and maintenance of mechatronic systems 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.

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** : The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.

— **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 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.

- Tutored autonomous activities.
Although they will have more of a face character have been taken into account in part for their idiosyncrasies, they will be primarily focused on seminars and tutorials under the supervision of the teacher.

- **Reinforcement activities.**

Non-contact marking character, through a virtual learning portal (Moodle) various activities that reinforce the basic contents of the subject be addressed. These activities can be customized or not, controlling their realization through it.

5.3.Program

The guidelines followed to develop the program of the course were as follows:
- Respect those proposed in the verification report content.
- Develop an agenda whose chapters are generally consistent with the titles of the specified program. When this was not done it was because of its size and / or correlation was included in another.
- Select a large bibliography of recognized technical, classical and current issues.
He selected the best literature topics treated and turned into a single text, design and own format, with innovative teaching resources. The teacher has not claimed to be unprecedented in its preparation, is based on texts by renowned, are only original objectives, organization and presentation of the material and drafting of some sections of the issues. The full text is available in the reprographic service of the school, as well as on digital media published in Moodle.
-The Main characteristics of text form can be summarized in eight subjects have, consistent with the content, completely developed, avoiding summaries.
-The Specific objectives achieved with the development of the text itself can be summarized as follows:

● Highlight the relationship between conceptual analysis and problem solving, using the number of examples needed to show approaches to solving them, stressing that solving is a process in which the conceptual knowledge is applied, and not It is merely a mechanized model for the solution. Therefore, in the text and the mental processes worked examples of problem solving based on the concepts, instead of highlighting the mechanical procedures are highlighted.

● Provide students practice in the use of analytical techniques presented in the text.
● Show students analytical techniques are tools, not goals, allowing quepractiquen in various situations in the choice of the analytical method they will use to obtain the solution.
● Encourage student interest in engineering activities, including real application problems.
● Develop problems and exercises using realistic values representing feasible situations.
● Encourage students to evaluate the solution, either with another method of resolution or by testing to see if it makes sense in terms of the known behavior of the circuit, machine or system.
● Show students how the results of a solution for additional encontrarinformación about the behavior of a circuit, machine or system are used.
● The resolution of most problems will require the type of analysis to be performed by an engineer to solve

real-world problems. Developed examples, where the mindset own engineering emphasizes, also serve as a basis for solving real problems.

The subject is structured around two complementary components contents:
- Theorists.
- Practical.

THEORETICAL CONTENTS.

The choice of the content of the various teaching units was made seeking clarification express purpose terminal so that the union of incidents knowledge, the student obtain a structured, easily assimilable for Mechatronics Engineers.
The theoretical contents are articulated based on eight teaching units attached table, indivisible blocks of treatment, given the configuration of the subject that program. These topics collect the contents needed for the acquisition of predetermined learning outcomes.

Topic 1	**Design of mechatronic systems** 1.1 Definition and evolution of engineering. 1.2 Main history of mechatronics. 1.3 What is mechatronics? 1.4 Philosophymechatronics versus traditional engineering . 1.5 Mechatronic systems. 1.6 Design concept. 1.7 Overview of process engineering design. 1.8 Design models applicable to mechatronic systems. 1.9 Conceptual design. 1.10 mechatronic design methodology. 1.11 Prototypes. 1.12 Design Tools. 1.13 Creativity.
Topic 2	**Maintenance of mechatronic systems.** 2.1 Introduction. 2.2 Concepts and maintenance goals. 2.3 History and evolution of maintenance. 2.4 Areas maintenance action. 2.5 Types and maintenance models. 2.6 Concepts associated maintenance. 2.7 Analysis of faults. 2.8 Failure mode and effects analysis (FMEA). 2.9 Predictive maintenance. 2.10 Total Productive Maintenance (TPM). 2.11 Risk-based Maintenance (RBM). 2.12 reliability centered maintenance (RCM).
Topic 3	**Security mechatronic systems.** 3.1 Introduction. 3.2 Laws, directives and standards.

	3.3 Risk Assessment. 3.4 Risk reduction. 3.5 General Validation. 3.6 Marketing 3.6.

PRACTICAL CONTENTS.

The laboratory workshop are designed for this course very important for the formation of the student.
Its aim is none other than to be covered learning outcomes of the course through a program of laboratory practices, encompassing aspects related to the following issues:
- Work With the tools, techniques and methods necessary involved in the design process of mechatronic systems from initial design to manufacturing planning.
- Apply The most common when planning a typology of maintenance methodologies, based on situations and analysis of results.
- Basic Notions of implementing security features in mechatronic systems.
The laboratory workshop practices to be developed by the student will be conducted in sessions of two hours.

5.4.Planning and scheduling

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 high.

Activity	Weekly school hours
Lectures	3
Laboratory	1
Others activities	6

Nevertheless the previous table can be shown into greater detail, taking into account the following overall distribution:

— 28 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.

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— 28 hours of laboratory workshop, in 1 or 2 hour sessions.

— 4 hours of written assessment tests, one or two hour per test.

— 90 hours of personal study, divided up over the 15 weeks of the semester.

The dates of the global evaluation test will be published officially in http://www.eupla.unizar.es/index.php/secretaria-2/informacion-academica/distribucion-de-examenes

Written continuous assessment tests are related to the following topics:

Las pruebas escritas de evaluación continua estarán relacionadas con los temas siguientes:

— **Written assessment test 1** : Topics 2.

— **Written assessment test 2** : Topics 3.

The most significant dates in the system of continuous assessment are contained in the following indicative timetable and may vary depending on the development, subject to the academic calendar lesson activity.

Activity	**Weekly school**													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Test 1										X				
Test 2														
Work		P						E	P					

P: proposed works E: delivery works

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5.5.Bibliography and recomended resources

Bibliography:

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- Gómez de León, Félix Cesareo. Tecnología del mantenimiento industrial / Félix Cesareo Gómez de León . - [1a. ed.] Murcia : Universidad de Murcia, 1998
- ois. Teoría y práctica del mantenimiento industrial / por François Monchy ; versión castellana y prólogo de Manuel Fraxanet de Simón . - [1a. ed.] Barcelona : Masson, 1990
- Kelly, A. A.. Gestión del mantenimiento industrial / A. Kelly y M.J. Harris. - 1ª edición Madrid : Fundación Repsol, 1998

Resources and materials used in the development of the subject are reflected in the following table:

Material	Format
Topic theory notes Topic problems	Paper/repository
Topic theory notes Topic presentationso Topic problems Related links	Digital/Moodle E-Mail
Circuit simulation software	Pc's laboratorio
Technical manuals	Paper/repository Digital/Moodle
Labware	

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