

## 29613 - Mechanics

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	110 - Escuela de Ingeniería y Arquitectura
<b>Degree</b>	430 - Bachelor's Degree in Electrical Engineering
<b>ECTS</b>	6.0
<b>Course</b>	2
<b>Period</b>	First semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **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 methodology:

The teaching process will be developed by mean of four main types of activities: theory classes, problem solving classes, laboratory classes and coursework.

- In the theory classes the theoretical principles of the Kinematic and Dynamic Analysis of Multibody 3D Systems will be exposed, and this theoretical knowledge will be applied to model real electromechanical systems.

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- In the problem solving classes, selected problems will be solved in coordination with the contents, taught in the theory classes.
- In the laboratory classes the student will model the kinematics and dynamics of real electromechanical systems.
- In the coursework the theoretical-practical concepts taught in the theory and problem classes will be applied to real electromechanical systems

### 5.2.Learning activities

The learning program offered to the students for helping them to achieve the proposed learning results include the following activities:

#### **PRESENIAL WORK: 2.4 ECTS (60 HOURS)**

##### **1) Theory Classes (Type T1) (30 hours).**

This kind of classes are taught to all the students of the group. In these classes the teacher will explain the theoretical foundations of the subject.

##### **2) Problem Solving Classes (type T2) (15 hours).**

In these classes selected problems will be solved with the participation of the students. The selected problems will be coordinated with the contents taught in the theory classes.

The theoretical-practical contents which cover the subject program are presented in the paragraph 5.3 of this document.

##### **3) Laboratory Classes (type T3) (15 hours).**

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In these classes the student will model the Kinematics and Dynamics of 3D Multibody Mechanical Systems starting from the Laboratory Classes Guideline Document.

Each student will be graded at the end of each laboratory session.

### **NON PRESENTIAL WORK: 3.6 ECTS (90 HOURS)**

#### **4) Coursework (type T6) (20 hours).**

This activity is devoted to develop a coursework carried out by groups of students.

The topic to be covered by the different coursework groups will be proposed by the teacher at the beginning of the semester.

#### **5) Study activities (Type T7) (66 hours) .**

This activity includes the time devoted by students to personal study wich concerns both the theoretical part of the subject and the problem solving tasks. It will be promoted the continuity of the work of the students by means of an homogeneous distribution of the diferente learning activities throughout the semester. The tutoring sessions are included in this learning activity. The tutoring sesions are devoted to identify learning problems and to answer questions related to theory, problems and coursework.

### **5.3.Program**

The Theretical-practical contents covered in the subject are:

-Introduction to Mechanics applied to Electrical Engineering.

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- Particle Kinematics
- Rigid-Body Kinematics
- Non-slip rolling Kinematics
- 3D Mechanical Systems Kinematics
- Forces in Mechanical Systems
- Mass-Geometry
- 3D Mechanical Systems Dynamics: Vectorial Theorems
- 3D Kinematic and Dynamic Modelling of Electromechanical Systems

### 5.4.Planning and scheduling

#### Presential classes and coursework presentation scheduling

##### Presential Classes:

The presential , problem solving and laboratory classes will be taught according to the schedule set by EINA (available in EINA web page and in <http://moodle.unizar.es>)

##### Tutoring Sessions

The tutoring sessions timetable and scheduling will be available in EINA web page and in <http://moodle.unizar.es>

##### Other learning activities related to the subject

The additional activities concernig the subject will be planned according to the number of students, the scheduling for these activities will be available for the students far enough in advance in <http://moodle.unizar.es>

**5.5. Bibliography and recommended resources**

*Bibliography* can be found in <http://psfunizar7.unizar.es/br13/eGrados.php?id=220>