Degree competences to which the subject contributes

Specific:
2. CC09 - Identify the symbols of mechanical systems and obtain the knowledge to determine the number of drives that will allow the desired movement of the system.

Transversal:
1. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Learning objectives of the subject

Mechanical systems are the material basis of automation, per therefore an Automàtica i ingeniiero in industrial electronics, must understand their movimento, transmission and causes that generate it. The objective of this course is to convey to students these skills.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 45h</th>
<th>Hours large group: 30h</th>
<th>66.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group: 15h</td>
<td>33.33%</td>
</tr>
</tbody>
</table>
# 340636 - FOME-R1P12 - Mechanical Fundamentals

## Content

| **Introduction to Mechanical Systems** | **Learning time:** 13h  
Theory classes: 8h  
Laboratory classes: 2h  
Self study: 3h |
|-------------------------------|-----------------------------------------------|

**Description:**  
Definition of System Mechanic. Kinematic scheme.  
Powertrain. Investment kinematic mechanisms.  
Outlining  

**Related activities:**  
CLASS THEORY AND PROBLEMS  
LABORATORY PRACTICE  
LEARNING ASSESSMENT  

**Specific objectives:**  
Introduce students to the symbolism of the mechanical systems and gain the knowledge to determine the number of drives that will allow the desired motion of the system:  
Acquire the concepts of machine, mechanism, kinematic chain element and kinematic pair.  
Identify and classify the pairs of a mechanism.  
Calculate and analyze the degrees of freedom and mobility of a mechanism.  
Understand the meaning of the reference system.  
Training for outlining kinematic mechanisms.  
Mastering the concept of kinematic equivalence.  

| **Kinematics. The movement in mechanical systems.** | **Learning time:** 19h 30m  
Theory classes: 7h  
Laboratory classes: 2h  
Self study: 10h 30m |
|----------------------------------------------------|---------------------------------------------------------------|

**Description:**  
Fundamental movements. Composition of movement.  
Calculating velocities planar mechanisms. Cinema of speeds.  
Calculating accelerations planar mechanisms. Cinema of accelerations.  

**Related activities:**  
CLASS THEORY AND PROBLEMS  
LABORATORY PRACTICE  
LEARNING ASSESSMENT  

**Specific objectives:**  
Understand and calculate the overall motion of mechanisms, from a cinematic point of view:  
Calculating the angular and linear velocities of mechanisms.  
Calculate the angular and linear accelerations mechanisms.  
Of solving relative motion mechanisms
### Static and dynamic. Causes of motion in mechanical systems

#### Description:
- Newton's Laws. Free body diagram.
- Troubleshooting static theorems using vector (Newton) and principle of virtual powers.
- Troubleshooting dynamics through fictitious inertial forces (d'Alembert).
- Troubleshooting using the dynamic principle of virtual powers
- Troubleshooting by Dynamic Energy Theorem

#### Related activities:
- CLASS THEORY AND PROBLEMS
- LABORATORY PRACTICE
- LEARNING ASSESSMENT

#### Specific objectives:
- Understand and calculate the forces that cause movement in mechanical systems.
- Identify the causes of motion.
- Vectorially represent and interpret the state of external stresses in a mechanical system.
- Calculating solve stresses which cause movement in the mechanical systems.
# Planning of activities

<table>
<thead>
<tr>
<th>(ENG) CLASSES TEORIA I PROBLEMES</th>
<th>Hours: 33h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 33h</td>
</tr>
<tr>
<td>Classroom work</td>
<td></td>
</tr>
</tbody>
</table>

**Support materials:**
- Notes from the Digital Campus
- Transparencies

**Specific objectives:**
- Meet the symbolism of mechanical systems and get the knowledge to determine the number of drives that will allow the desired motion of the system
- Acquiring the ability to generate and solve the equations of motion for mechanical systems multi body

<table>
<thead>
<tr>
<th>LABORATORY PRACTICE</th>
<th>Hours: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Laboratory classes: 10h</td>
</tr>
<tr>
<td>Conduct by the student of practical work and mechanical computer simulations</td>
<td></td>
</tr>
</tbody>
</table>

**Support materials:**
- Computer and software simulation
- Mechanical models

<table>
<thead>
<tr>
<th>LEARNING ASSESSMENT</th>
<th>Hours: 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td>Individual written tests</td>
<td></td>
</tr>
</tbody>
</table>

**Specific objectives:**
- Certify the level of achievement of learning
The final grade (QF) of the subject is obtained from the expression:

\[ QF = 0.25 \times \text{Rated Practice} + 0.75 \times \text{Rated Final Exam}. \]

Evaluation acts and weight are:

1st act of evaluation (weight 0.25):
Practices (realitzadas in mechanical laboratoroi in groups of two students with teacher support. Subsequently a report that will help you deliver the QUALIFICATION is.)

2nd act of evaluation (weight 0.75):
Final Exam. (includes tota matter)

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Regulations for carrying out activities

Without documentation
No calculator

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Bibliography

Basic: