### Degree competences to which the subject contributes

#### Specific:
1. CE15. Basic knowledge of production and fabrication systems.
2. CE29. Ability to design automotion control systems.

#### Transversal:
1. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.
2. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

### Teaching methodology

Master classes, active learning and participative expositive classes, projects and problems based learning, and study of real cases.

### Learning objectives of the subject

- Identify and analyze the elements of a robot, their specifications and terminology.
- Describe and analyze the models of a robot.
- Describe the robot control techniques.
- Know the robot programming techniques.
- Know the criteria, methodology and standards about the implantation of robots, evaluating their integration capability in a social or industrial environment.
### Study load

<table>
<thead>
<tr>
<th><strong>Total learning time:</strong> 150h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>30h</td>
<td>20.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
## Content

### (ENG) 1 Background

**Description:**
- Definition
- Classification
- Brief history
- Robots morphology
- Joints
- Industrial applications

**Related activities:**
- PR1

**Specific objectives:**
Locate the robot in the industrial domain and pay attention to collaborative tasks with humans. Know the different parts that the robot is composed.

**Learning time:** 6h
- Theory classes: 6h

### (ENG) -2 Geometrics, Kinematics and dynamics

**Description:**
- Position and orientation representation
- Kinematic modelling
- Dynamic modelling

**Related activities:**
- PR2

**Specific objectives:**
- Learn geometry, kinematics and dynamic aspects to understand the robot control movement of the next chapter

**Learning time:** 18h
- Theory classes: 18h
| (ENG) -3 Control and robots programming | Learning time: 6h  
Theory classes: 6h |
|----------------------------------------|-----------------|
| **Description:**  
Control architectures  
Control based in dynamic model  
Adaptative control  
Effort control  
Path generation  
GEstual and Textrual programming |
| **Related activities:**  
PR1, PR2, PR3 |
| **Specific objectives:**  
Learn some aspects of dynamic control and programming in order to prepare robotic tasks |

| (ENG) -4 Mobile Robotics | Learning time: 4h  
Theory classes: 4h |
|--------------------------|-----------------|
| **Description:**  
Introduction to mobile robotics |
| **Related activities:**  
PR4 |
| **Specific objectives:**  
Know the science of the wheeled mobile robots |

| (ENG) PR1 Industrial robots programming | Learning time: 4h  
Theory classes: 4h |
|----------------------------------------|-----------------|
| **Description:**  
Introduction to programming robot system  
Programming tools  
Edition and programming  
Examples  
Porfolio |
| **Specific objectives:**  
Learn the basic instructions for the programming of robotic tasks |
### (ENG) PR2 Robots: Modeling and simulation

<table>
<thead>
<tr>
<th>Description:</th>
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</thead>
<tbody>
<tr>
<td>Introduction to the robotics toolbox Matlab</td>
</tr>
<tr>
<td>Study of the Spacial transformations</td>
</tr>
<tr>
<td>Study of the kinematic model</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn to use the mathematic tools in order to analyze the science behind robots</td>
</tr>
</tbody>
</table>

**Learning time:** 8h  
Theory classes: 8h

### (ENG) PR3 Programming robots tools

<table>
<thead>
<tr>
<th>Description:</th>
</tr>
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<tbody>
<tr>
<td>Introduction to programming and simulations robots</td>
</tr>
<tr>
<td>Programming a robotized task</td>
</tr>
<tr>
<td>Programming a robotized system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know advanced tools for program and simulate industrial robots</td>
</tr>
</tbody>
</table>

**Learning time:** 2h  
Theory classes: 2h

### (ENG) PR4 Mobile robots

<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>Programming wheeled mobile robots</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn to solve mobile robot tasks using the acquired theoretical knowledge</td>
</tr>
</tbody>
</table>

**Learning time:** 2h  
Theory classes: 2h

### PR5 Miniproject

<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>Conducting a group project</td>
</tr>
</tbody>
</table>

**Learning time:** 10h  
Theory classes: 10h
340128 - SIRO-K6007 - Robotic Systems

**Qualification system**

Individual tests in the middle of the course (60%)
Team work (40%)

- Presentations in group about a theme or project related to robotics
- Laboratory Practicum and activities proposed during the course

Re-evaluation may be accessed in accordance with school regulations

**Bibliography**

**Basic:**


**Complementary:**

