Degree competences to which the subject contributes

Specific:
2. CE15. Basic knowledge of production and fabrication systems.
3. CE29. Ability to design automation 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.
4. 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.

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

**Specific objectives:**  
Learn the basic intructions for the programming of robotic tasks
# 340128 - SIRO-K6007 - Robotic Systems

<table>
<thead>
<tr>
<th><strong>(ENG) PR2 Robots: Modeling and simulation</strong></th>
<th><strong>Learning time:</strong> 8h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td>Introduction to the robotics toolbox Matlab</td>
<td></td>
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<tr>
<td>Study of the Spacial transformations</td>
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<tr>
<td>Study of the kinematic model</td>
<td></td>
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<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
<tr>
<td>Learn to use the mathematic tools in order to analyze the science behind robots</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>(ENG) PR3 Programming robots tools</strong></th>
<th><strong>Learning time:</strong> 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 2h</td>
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<tr>
<td>Introduction to programming and simulations robots</td>
<td></td>
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<tr>
<td>Programming a robotized task</td>
<td></td>
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<tr>
<td>Programming a robotized system</td>
<td></td>
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<tr>
<td><strong>Specific objectives:</strong></td>
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</tr>
<tr>
<td>Know advanced tools for program and simulate industrial robots</td>
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</table>

<table>
<thead>
<tr>
<th><strong>(ENG) PR4 Mobile robots</strong></th>
<th><strong>Learning time:</strong> 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td>Programming wheeled mobile robots</td>
<td></td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
<tr>
<td>Learn to solve mobile robot tasks using the acquired theoretical knowledge</td>
<td></td>
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<thead>
<tr>
<th><strong>PR5 Miniproject</strong></th>
<th><strong>Learning time:</strong> 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 10h</td>
</tr>
<tr>
<td>Conducting a group project</td>
<td></td>
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</tbody>
</table>
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:

