**Course guide**

**240172 - 240172 - Automatic Control**

**Unit in charge:** Barcelona School of Industrial Engineering  
**Teaching unit:** 707 - ESAII - Department of Automatic Control.

**Degree:**  
BACHELOR’S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).  
BACHELOR’S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Optional subject).

**Academic year:** 2022  
**ECTS Credits:** 6.0  
**Languages:** Catalan, Spanish

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**LECTURER**

**Coordinating lecturer:** Roberto Griñó  
**Others:** Roberto Griñó - Enric Fossas - Miguel A. Mañanas - Carlos Ocampo - Vicenç Puig - Maria Serra - Joaquim Triginer - Stefano De Pinto - Leidy Y. Serna - Angel Santamaria - Alejandro Clemente

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**DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES**

**Specific:**  
1. Capacity to design control systems and industrial automation.  
2. Knowledge on automatisms' fundamentals and control methods.  

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**TEACHING METHODOLOGY**

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**LEARNING OBJECTIVES OF THE SUBJECT**

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**STUDY LOAD**

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>48,0</td>
<td>32.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>12,0</td>
<td>8.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

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**CONTENTS**

**ENG) Tema 1 Introduction to digital control**

**Description:**  

**Full-or-part-time:** 5h  
Theory classes: 2h  
Self study: 3h
(ENG) Tema 2 Sampling of signals

Description:

Full-or-part-time: 10h
Theory classes: 4h
Self study : 6h

(ENG) Tema 3 Discrete-time systems

Description:
Definition of z transform. Properties of the z transform. Correspondence between the s-plane and the z-plane. Calculation of z transforms. Calculation of inverse z transforms, z domain transfer function. Block diagrams. Simplification. Closed-loop systems. Open-loop transfer functions (L) and closed-loop transfer functions (T,S).

Full-or-part-time: 19h
Theory classes: 7h
Self study : 12h

(ENG) Tema 4 Time-domain analysis

Description:

Full-or-part-time: 37h
Theory classes: 12h
Laboratory classes: 3h
Self study : 22h

(ENG) Tema 5 Frequency domain analysis

Description:

Full-or-part-time: 25h
Theory classes: 7h
Laboratory classes: 3h
Self study : 15h
(ENG) Tema 6 Design and implementation of digital controllers

Description:
Control algorithms and digital controllers. Digital PID controllers. Frequency domain design of lead and lag controllers. Root locus design of lead and lag controllers. Root locus design of PI and PD controllers. Algebraic design of digital controllers: Pole assignment and other specifications, general controllers and PID controllers. Control algorithms programming. Selection of the sampling period. Quantification and computation time effects.

Full-or-part-time: 51h
Theory classes: 13h
Laboratory classes: 6h
Self study: 32h

GRADING SYSTEM

BIBLIOGRAPHY

Basic:

Complementary: