820229 - SICIEIA - Information Systems and Industrial Communication

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control
Academic year: 2019
Degree: BACHELOR’S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6 Teaching languages: Catalan

Teaching staff
Coordinator: Pere Ponsa
Others: Javier Gámiz, Cristina Lampón, Marc LLuva, Manuel Lozano, Pere Ponsa,

Opening hours
Timetable: Room Office A5.42

Requirements
CONTROL INDUSTRIAL I AUTOMATITZACIÓ - Precorequisit

Degree competences to which the subject contributes
Specific:
1. Enter the student / the concepts of the various industrial communication techniques, terminology and the reference standards
2. To enable the student / a to discern the functional characteristics of wireless communications and communication networks to plan based industrial field buses.
3. Enter the student / the basic concepts of systems Supervisory Control and Data Acquisition and enable the student / a

Transversal:
06 URI N2. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.
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.

Teaching methodology
The course uses the teaching class, case study, examples, exercises and project based learning approach.

Learning objectives of the subject
1. Enter the student / the concepts of the various industrial communication techniques, terminology and the reference standards
2. To enable the student / a to discern the functional characteristics of wireless communications and communication networks to plan based industrial field buses.
3. Enter the student / the basic concepts of systems Supervisory Control and Data Acquisition and enable the student / a
to define and configure the functionality of the (input-output historical databases, synoptic charts, etc.. ).

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 45h</th>
<th>30.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
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<tr>
<td></td>
<td>Hours small group: 15h</td>
<td>10.00%</td>
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<td></td>
<td>Guided activities: 0h</td>
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<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
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### Content

<table>
<thead>
<tr>
<th>(ENG) Tema 1: Information systems</th>
<th>Learning time: 12h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<tr>
<td></td>
<td>Self study: 6h</td>
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**Description:**
1.1. Information systems.
1.2. Manufacturing Operation Management (MOM).
1.3. Information systems in Industry 4.0.
1.4. Human-machine information. Panel, HMI and SCADA.
1.5. Intelligent instrumentation.

**Related activities:**
- Autonomous study
- Exercises
- Report

**Specific objectives:**
Students will be able to:
- identify trends in modern automation systems

<table>
<thead>
<tr>
<th>(ENG) Tema 2: SCADA systems</th>
<th>Learning time: 12h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<tr>
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<td>Self study: 6h</td>
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**Description:**
2.1. Definition of supervisory control. From plant to control room.
2.2. Main features of supervision systems.
2.3. SCADA modules.
2.4. Functionality.
2.5. Exercises and examples.
2.6. Design of SCADA applications.
2.7. OPC communications.

**Related activities:**
- Written exam
- Exercises
- Report
- Practice Laboratory

**Specific objectives:**
Students will be able to:
- Apply a SCADA solution in automation systems.
**(ENG) Tema 3: Communications Systems**

<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>3.1. Introduction to Communication Systems.</td>
</tr>
<tr>
<td>3.2. Digital Communications.</td>
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<tr>
<td>3.3. Networks topology.</td>
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<tr>
<td>3.4. Reference models. OSI, TCP/IP.</td>
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<tr>
<td>3.5. MQTT architecture and protocol.</td>
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<td>3.6. 5G.</td>
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<table>
<thead>
<tr>
<th>Related activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Autonomous study</td>
</tr>
<tr>
<td>- Exercises</td>
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<tr>
<td>- Practice Laboratory</td>
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</table>

**Specific objectives:**

Student will be able to:

- Classify Network communications

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<tr>
<th>Learning time: 12h</th>
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<tr>
<td>Theory classes: 6h</td>
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<tr>
<td>Self study : 6h</td>
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**(ENG) Tema 4: Industrial networks**

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<th>Description:</th>
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<tbody>
<tr>
<td>4.1 Process control networks.</td>
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<tr>
<td>4.3. Serial communications.</td>
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<tr>
<td>4.4. Ethernet/IP.</td>
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<tr>
<td>4.5. Programmable Logic Controllers networks.</td>
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<tr>
<th>Related activities:</th>
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<tbody>
<tr>
<td>- Examen</td>
</tr>
<tr>
<td>- Exercises</td>
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<tr>
<td>- Practice laboratory</td>
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**Specific objectives:**

Students will be able to:

- Configure LAN networks and field buses.

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<tr>
<th>Learning time: 12h</th>
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<td>Theory classes: 6h</td>
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<tr>
<td>Self study : 6h</td>
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</table>
(ENG) Tema 5: Practices of Laboratory

Description:
5.2. Control level. Input/Output connectivity to PLC. Automatic control with PLC.
5.3. Communications level. Serial Communications. PC network,
5.4. Communications level. Ethernet network. PLC network.
5.5. Communications level. SCADA-PLC communications.
5.6. Assembly manufacturing system.
5.7. HMI display design.

Related activities:
- Exercises
- Searching for data sheets
- Laboratory practices

Specific objectives:
Students will be able to:
acquire skills in advanced automation systems: GRAFCET integrated, PLC programming, HMI interface design, SCADA display design.

Planning of activities

AD: Connected Industry

Hours: 57h
Theory classes: 21h
Self study: 36h

Description:
The skill in this subject is search of Information resources. Following examples and technical study cases, the students will be able to search information about the connected enterprise (industry 4.0).

Support materials:
Papers in technical journals.

Descriptions of the assignments due and their relation to the assessment:
Month assessment and deadline (report) at the end of the semester.

Specific objectives:
Understand the new industrial paradigm.
Writting a polite technical report in automation.

Qualification system

First exam: 30%
Second exam: 25%
Practice Lab: 25%
Other controls AD: 20%
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**Regulations for carrying out activities**

The evaluation method of this course meets the current academic regulations to be qualified: NO REVALUABLE.

**Bibliography**

**Basic:**


**Complementary:**


**Others resources:**

Teaching material in Virtual Campus.
Teaching help support (Wonderware, Rockwell Automation, SMC),