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: PEDRO PONSA ASENSIO
Others: Primer quadrimestre:
JAVIER FRANCISCO GÁMIZ CARO - T11, T12, T13, T14
MARC LLUVA SERRA - T11, T12
MANUEL LOZANO GARCÍA - T13, T14

Opening hours
Timetable: Room Office A5.42

Requirements
CONTROL INDUSTRIAL I AUTOMATITZACIÓ - Precorequisite

Degree competences to which the subject contributes

Specific:
2. Apply their knowledge to industrial informatics and communications.
3. Design automatic control systems.

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.
4. 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.).

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

### (ENG) Tema 1: Information systems

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 12h</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1. Data, instrumentation and knowledge.</td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>1.2. Process, plant and Manufacturing Operation Management (MOM).</td>
<td>Self study: 6h</td>
</tr>
<tr>
<td>1.3. Database and structured query language.</td>
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<td>1.4. Connected enterprise.</td>
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<tr>
<td>1.5. Intelligent instrumentation.</td>
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</tbody>
</table>

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

**Specific objectives:**
Students will be able to:
- Identify current trends in technologies and the connected enterprise.
- Identify the importance of data management in automated environments.

### (ENG) Tema 2: SCADA systems

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 12h</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Supervisory control. Monitoring, alarms and fault detection.</td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>2.2 Modules and functionality of SCADA systems.</td>
<td>Self study: 6h</td>
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<tr>
<td>2.3 Architecture: Server/client, virtual server.</td>
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<tr>
<td>2.4 Programming with Scripts.</td>
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<tr>
<td>2.5. Design of SCADA applications.</td>
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<tr>
<td>2.6. OPC communications.</td>
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</tbody>
</table>

**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

**Description:**
- 3.1. Introduction to Communication Systems.
- 3.2. Digital Communications.
- 3.4. Reference models. OSI, TCP/IP.
- 3.5. OPC-UA and MQTT architecture and protocol.
- 3.6. 5G and Internet of things.

**Related activities:**
- Autonomous study
- Exercises
- Practice Laboratory

**Specific objectives:**
Students will be able to:
Classify and modelling of communications systems.

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

**Description:**
- 4.1 Process networks functionalities.
- 4.3. Serial communications.
- 4.4. Ethernet/IP.
- 4.5. Programmable Logic Controllers networks.

**Related activities:**
- Examen
- Exercises
- Practice laboratory

**Specific objectives:**
Students will be able to
Configure LAN networks and field buses in the A5.4 Laboratory.
(ENG) Tema 5: Practices of Laboratory

**Learning time:** 45h
- Laboratory classes: 15h
- Self study: 30h

**Description:**
- 5.1. Design and programming SCADA applications.
- 5.2. Communications DDE SCADA with Emulated PLC.
- 5.3. PLC network with Ethernet over an assembly academic system.
- 5.4. OPC SCADA-PLC communications.
- 5.5. SCADA communications with IoT Platforms.

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

**Specific objectives:**
Students will be able to:
- acquire skills in advanced automation systems: PLC programming and configuration, communication protocols, SCADA application design.

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### 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.
- Industrial study case analysis.
- Writting a polite technical report in automation.

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### Qualification system

- First exam: 30%
- Second exam: 25%
- Practice Lab: 25%
- Other controls AD: 20%
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),