Course guide

330112 - II - Industrial Informatics

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.
Degree: BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject). BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Optional subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: Catalan

LECTURER

Coordinating lecturer: ANTONI ESCOBET CANAL

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. The ability to specify, analyze, design, evaluate, and document processor-based systems, as well as their implementation alternatives.
2. The ability to use the tools and programming languages of processors.
3. The knowledge and ability to use existing tools and instrumentation for the analysis, design, development and verification of electronic, computer and communications systems.

Transversal:
4. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
6. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

TEACHING METHODOLOGY

The course consists of face-to-face activities consisting of 2 hours per week of class and 2 hours per week of laboratory practices. The student carries out learning through various mechanisms. In the lectures and participative classes the contents of the subject are presented and the interaction between students and teacher is facilitated. Individual / group personal work activities are also proposed that should contribute to the understanding of the subject.
In laboratory classes, students carry out preliminary work that helps to put into context the work that is intended to be developed in the laboratory. The laboratory activity itself is developed in groups of two students and allows experimentation with certain aspects developed in the subject. The writing of the memory and the interaction with the teacher in the laboratory allows working on the oral and written communication skills.
On a regular basis, technical documentation in English of digital electronic circuits is used, contributing to the learning of this language.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the student's Industrial Informatics course:

- Will have a sufficient theoretical and technological base to be able to solve computer applications and communications networks in the automation and control of industrial processes.
- You will be able to write simple technical reports and present them orally.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

1. INTRODUCTION

Description:
This topic presents the basic concepts of industrial computing and its application environment.

Related activities:
All.

Full-or-part-time: 4h
Theory classes: 2h
Self study: 2h

2. THE INDUSTRIAL COMPUTER

Description:
This topic presents the structure of an industrial computer, the hardware and software architecture. The basic notions of an operating system and the aspects of structured programming are given by the design of industrial programs.

Related activities:
All.

Full-or-part-time: 45h
Theory classes: 9h
Practical classes: 10h
Self study: 26h

3. DATA ACQUISITION AND DISTRIBUTION SYSTEMS

Description:
This topic describes the signal distribution system in an industrial computer and the data acquisition systems. Survey, interrupt, and DMA data transfer techniques are described. Different business data acquisition cards are introduced and application programming interfaces (APIs) are explained.

Related activities:
All.

Full-or-part-time: 53h
Theory classes: 9h
Practical classes: 12h
Self study: 32h
# 4. FIELD BUSES

**Description:**
Introduction to industrial communications. Communication architectures: the OSI reference model and the TCP/IP standard. Know the communication technology and the aspects of communication with the network. Examples of protocols and industry standards.

**Related activities:**
All.

**Full-or-part-time:** 48h
- Theory classes: 10h
- Practical classes: 8h
- Self study: 30h

## ACTIVITIES

### 1. EXPOSURE AND PROBLEM CLASS

**Description:**
In the classes the theoretical aspects of the subject will be developed. These will allow interaction between and the teacher.

**Specific objectives:**
- Know and remember the elements of a computer.
- Know and know how to use the high-level software of a computer.
- Know and remember data transfer techniques.
- Know and know how to use the development tools of computer systems applied to processes.

**Material:**
Published teaching material. Recommended bibliography.

**Delivery:**
Occasionally some evaluable activity will be carried out, which will contribute in a proportional part to the EXE variable.

**Full-or-part-time:** 28h
- Theory classes: 28h
2. LABORATORY CLASS

Description:
The practices that will be carried out in the laboratory will be two hours a week, in groups of two people. The student will have the statement of the practice that must be posted in the Athena. The laboratory will have a computer equipped with the necessary software. Likewise, the necessary hardware will be available to be able to experiment on commercial plates. The teacher will monitor the evolution of the students in particular. At the end of each practice, each group will send an email to the practice teacher attaching a file where the work done and the knowledge acquired will be explained.

Specific objectives:
- Implement the laboratory programs for computer systems.
- Validate the operation of the programs.
- Write and present documents reflecting the design and validation process of the solutions provided.

Material:
Electronic equipment, data acquisition board, digital devices, computer with suitable software. Statement of the practice and supporting information to carry out the work.

Delivery:
Before carrying out the practice, the students will deliver the previous individual study corresponding to the practice to be carried out.
During the session, the achievement of the objectives of each laboratory session will be assessed, taking into account the degree of understanding of the work demonstrated by each student.
At the end of the session, each working group will prepare a final report that reflects the main characteristics of the actual work. The qualification obtained in these activities configures the LAB variable.

Full-or-part-time: 75h
Practical classes: 45h
Laboratory classes: 30h

3. INDIVIDUAL / GROUP PERSONAL WORK

Description:
The student must develop certain activities personally to achieve the objectives of the subject.

Specific objectives:
All of the subject.

Material:
Published teaching material. Recommended bibliography.

Delivery:
Individual / group personal work will be translated, in part, into exercises during the course. The grading of these exercises will contribute to the EXE variable.

Full-or-part-time: 20h
Self study: 20h
4. TESTS

Description:
During the course, some individual control test (variable CON) will be carried out. At the end of the course, a final globalizing test of the acquired knowledge will be carried out (variable FIN).

Material:
Test statements.

Full-or-part-time: 27h
Theory classes: 2h
Self study: 25h

GRADING SYSTEM

The final grade for the course will be obtained as follows:

Final mark = 0.10 * EXE + 0.40 * LAB + 0.30 * CON + 0.20 * END

Note. When the results of the evaluation acts corresponding to individual activities are substantially lower than those obtained in group activities, the individual execution of activities similar to those carried out in a group may be required. The last qualification will replace the original ones.

Re-evaluation:

Students who have obtained a 'failed' grade in the regular evaluation period can access the reevaluation process.

Those students who have a 'no-show' or have passed the course in the regular evaluation period cannot access the re-evaluation process.

The result of the re-evaluation is a grade that replaces the grade obtained in the ordinary evaluation process, which is higher than this and, in any case, it will be a maximum of 'pass' 5.

If RR is the result of the reevaluation process and NER is the mark of the reevaluation exam then:

Note RR = minimum {5, 015 * EXE + 0.15 * CON + 0.35 * LAB + 0.35 NER}

EXAMINATION RULES.

In the case of laboratory activities for which a previous study has been established, it will be mandatory to submit it before accessing the laboratory.

Those activities that are explicitly declared as individual, whether in person or not, will be carried out without any collaboration from other people.

The dates, formats and other delivery conditions that are established will be mandatory.

BIBLIOGRAPHY

Basic:
- Notes d'aplicació dels fabricants.

Complementary: