Course guide
330112 - II - Industrial Informatics

Last modified: 24/05/2026

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 2016). (Compulsory subject).
BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Optional subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** Catalan, English

LECTURER

Coordinating lecturer: Comerma Montells, Albert

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 may carry out preliminary work to help 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 and evaluation of the third language.
On a regular basis, technical documentation in English of digital electronic circuits is used, contributing to the learning of this language.
Two mid term tests will be carried out to verify the progress,

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

Type	Hours	Percentage
Hours large group	30,0	20.00
Self study	90,0	60.00
Hours small group	30,0	20.00

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

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

The final grade for the course will be obtained as follows, EXE (exercises), CON (mid term exams, CON1 and CON2), LAB (Laboratory reports), END (Final exam);
Final grade = 0.15 * EXE + 0.35 * LAB + (0.1*CON1 + 0.1*CON2 + 0.3 * END).
For the individual evaluation exams (CON1, CON2 and END) a minimum weighted average of 3.5 must be obtained to add the rest of grades; if this grade is not achieved the final grade will be equal to this individual evaluation exams weighted average.

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:
- Miguel Anasagasti, Pedro de. Fundamentos de los computadores. 9ª ed. Madrid: Thomson Paraninfo, 2004. ISBN 8497322940.
- Rodríguez Penin, Aquilino. Comunicaciones industriales [on line]. Barcelona: Marcombo, 2008 [Consultation: 27/05/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=3175914. ISBN 9788426715104.
- Notes d'aplicació dels fabricants.

Complementary:
- Tojeiro Calaza, Germán; Reino Bértoa, J. Gerardo. Taller de Arduino: experimentando con Arduino MKR 1010 [on line]. 2a edición. Barcelona: Marcombo, 2020 [Consultation: 24/05/2022]. Available on: https://search-ebscohost-com.recursos.biblioteca.upc.edu/login.aspx?direct=true&AuthType=ip,uid&db=nlebk&AN=2749508&site=ehost-live&ebv=EK&ppid=Page-__-1. ISBN 9788426726162.