

# Course guide

## 330533 - FA - Automated Manufacturing

**Last modified:** 04/05/2023

**Unit in charge:** Manresa School of Engineering  
**Teaching unit:** 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

**Degree:** BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** Catalan

### LECTURER

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**Coordinating lecturer:** Leon Pardo, Miquel

**Others:** Escobet Canal, Teresa

### REQUIREMENTS

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Have taken the following subjects of: "Computer-aided manufacturing", "Electronic systems", "System Analysis and Control".

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

CE13. Knowledge and application of production and manufacturing systems.  
CE21. Knowledge of automatic regulation, control techniques and its application to industrial automation.

**General:**

CG1. Ability to write and develop projects in the field of automotive engineering for the construction, renovation, repair, maintenance, recycling, manufacture, installation, assembly or operation of: structures, mechanical equipment, energy installations, electrical and electronic installations, plants and industrial plants and manufacturing and automation processes.  
CG3. Knowledge of basic and technological subjects that will enable students to learn new methods and theories and that will endow them with the versatility needed to adapt to new situations.  
CG4. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and skills in the field of automotive engineering.

**Transversal:**

1. 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.  
2. 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.

**Basic:**

CB2. Students will be able to apply their knowledge to their work or vocation in a professional manner and demonstrate that they possess the competencies that are typically demonstrated by elaborating and defending arguments and solving problems in the field of study.

## TEACHING METHODOLOGY

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The methodology employed at this subject is learning based on problems, and on practices of laboratory. The subject features 4 hours for every week

Of these four weekly hours, one devotes at presenting the principal contents demonstratively. The second hour devotes at the resolution of problems at the classroom, and the two remaining at resolving the practical problems and practices at the corresponding laboratory. Therefore, much of the part of solving problems like the resolution of the part of practices will comport an individual task and a cooperative task respectively.

Let's comment the working methodology:

- At the part that we have qualified as a learning based on problems, an expositive part is presented to the students. The students, individually or in groups, works with the matter and makes a presentation.
- At bands of 2 or 3 persons, depending on the enrollment it that there is at the subject, a practice wording is presented to be solved in the computer classroom or in the control laboratory. In order to work the wordings with groups, it will be necessary to analyze the distinct proposals that resolve the wording posed and schedule one proposal of the group for the resolution of the problem.
- With groups it is necessary to solve the problem and assess his solution.
- At the end it is necessary to make an exposure of the solution proposed and the results achieved, in an inform that will be assessed.

## LEARNING OBJECTIVES OF THE SUBJECT

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The primary aim of the subject is the familiarization of the student with the fabrication automated, applied to the sector of the car.

At the end of the subject, the students:

1. Will have acknowledged the basic principles of the industrial automation.
2. Will be qualified by making a model and analyze systems of discrete events and realize the automation of a process.
3. Will be capable to program industrial programmable (PLC)
4. Will meet the principal apps of the industrial robots and basic principles for his programming.
5. Will meet the systems of artificial vision as a tool of control of quality at installations robotized.
6. Will know the systems SCADA.

## STUDY LOAD

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

**Total learning time:** 150 h



## CONTENTS

### UNIT 1: INTRODUCTION AT THE AUTOMATED FABRICATION

**Description:**

The aim of this unit is to know how to describe the automation automated and give a general vision of its evolution.

- Definition
- Evolution
- Current paradigm: systems of flexible fabrication, quality, maintenance, security, pyramid CIM, industry 4.0
- Relation with other subjects: Fabrication assisted by computer, electronic Systems, Analysis of Systems and Control, TIC in automotive.

**Full-or-part-time:** 5h

Theory classes: 4h

Self study : 1h

### UNIT 2: SYSTEMS AUTOMATED

**Description:**

At this unit the basic of a system automated is presented:

- Components electro-mechanical: machines, actuators, preactuators, sensors
- Systems of control: squads of control of machine (PLCs) and communications
- Elements of programming of PLCs
- Supervisory Systems and motorization (SCADA)

**Related activities:**

You're proctiques.

Provides writing.

**Full-or-part-time:** 55h

Theory classes: 8h

Laboratory classes: 12h

Self study : 35h

### UNIT 3: SECURITY AT THE AUTOMATED INSTALLATIONS

**Description:**

In this unit the analysis of security of the installations automated are presented:

- Normative
- Systems of security and protection of machines
- Analysis of risks
- Level of protection

**Related activities:**

You're proctiques.

Provides writing.

**Full-or-part-time:** 25h

Theory classes: 6h

Laboratory classes: 4h

Self study : 15h



#### UNIT 4: ROBOTIZED SYSTEMS

**Description:**

At this unit the industrial robots and his programming is described. It structures at four sections:

- Definition and classification
- Morphology of the robot
- Actuators, internal sensors and terminal elements
- Programming and control

**Related activities:**

You're proctiques.  
Provides writing

**Full-or-part-time:** 47h

Theory classes: 8h

Laboratory classes: 10h

Self study : 29h

#### UNIT 5: SYSTEMS OF AUTOMATED CHECK:

**Description:**

At this unit the use of the artificial vision applied at the check automated is described:

- Introduction at the artificial vision
- Operation
- Industrial Apps

**Related activities:**

You're proctiques.  
Provides writing.

**Full-or-part-time:** 18h

Theory classes: 4h

Laboratory classes: 4h

Self study : 10h

## ACTIVITIES

### FIRST ACTIVITY: PRACTISES

**Description:**

During the course varied practical problems at resolving that it will be necessary to realize during the practical sessions will be proposed.

**Specific objectives:**

The corresponding at the contents of the subject.

**Material:**

The previous development and the execution of the will be valued equally.

The materials of support are:

- Equipment of laboratory
- Simulators
- Bibliography recommended
- Docent material published.

**Delivery:**

The achievement of the aims attained at each problem will be valued, taking into account the rank of realization of the work evidenced by each student.

At the very end, every group will hand at the teacher of practices a file where will explain the work realized and the knowledge acquired and, if that's the case, will make a public presentation of the work realized.

The qualification obtained at these activities configures the variable LAB.

**Full-or-part-time:** 76h

Laboratory classes: 30h

Self study: 46h

### ACTIVITY: PROVIDES WRITING

**Description:**

During the course there will be an individual control test. At the end of the course there will be a final globalizing test of the knowledge acquired.

**Specific objectives:**

Solve practically and individually the problem posed.

**Material:**

Support statements

The work done throughout the course

**Delivery:**

The control test score sets the variable CON.

The final test grade sets the FIN variable.

**Full-or-part-time:** 44h

Theory classes: 6h

Self study: 38h

## GRADING SYSTEM

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The final grade of the subject will be obtained as follows:

$$\text{final qualification} = 0.20 * \text{CON} + 0.50 * \text{LAB} + 0.30 * \text{FIN}$$

## EXAMINATION RULES.

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The activities will be done following the uses and habits of the academic work and, must respect the following guidelines:

1. Those activities that are explicitly declared as individual, whether they are in person or not, are not allowed to be done by any other people.
2. The dates, formats and other conditions of delivery that have been fixed will be of obliged fulfillment.
3. The realization of the activities of laboratory are necessary conditions to approve the subject.
4. If there is just one activity not done, the mark of the subject will be considered as a zero.

## BIBLIOGRAPHY

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### Basic:

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- Barrientos, Antonio. Fundamentos de robótica [on line]. 2ª ed. Madrid: McGraw-Hill, 2007 [Consultation: 03/06/2022]. Available on: [https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB\\_BooksVis?cod\\_primaria=1000187&codigo\\_libro=4101](https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4101). ISBN 9788448156367.
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