

Course guide

205095 - 205095 - Safety Automation Projects for Industry 4.0

Last modified: 11/04/2025

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Optional subject).
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2025). (Optional subject).

Academic year: 2025 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Rita Maria Planas Danglà

Others: Jan Pascual

TEACHING METHODOLOGY

The course is divided into parts:

- Theoretical and work group sessions
- Laboratory sessions

Self-study (including proposed exercises and activities) will be also contemplated.

In the theory classes, teachers will introduce the theoretical basis of the concepts, methods and results and illustrate them with examples appropriate to facilitate their understanding. Students, working in groups will use the new concepts to specify its solution in order to solve the proposed challenge..

In the lab sessions, teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning.

Students, independently, need to work on the materials provided by teachers in order to fix and assimilate the concepts.

The teachers provide the syllabus and monitoring of activities (by ATENEA

LEARNING OBJECTIVES OF THE SUBJECT

This course is based in the practical development of a "hands-on" application on Safety Automation under Industry 4.0 specifications. The applications to be developed, will be proposed as real challenges and will be supervised by lecturers.

Depending on proposed challenges, applications will be developed individually, by pairs or by groups and in all cases, teachers will assess and supervise each student's teamwork in order to help them in the project development and to solve possible doubts

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours small group	27,0	36.00

Total learning time: 75 h

CONTENTS

Module 1:

Description:

Introduction to Industry 4.0

Introduction to Industrial Safety

Safety Automation:

- Safety Design (ISO 13849-1/ EN 62061)
- Risk Assessment
- Security components
- How to design a safety system?
- Using a 'normal' PLC, a safety relay or a safety PLC
- Programming environments for safety automation devices.

Related activities:

To develop the complete practical solution about safety automation and safety robotics for the given challenge.

Students must take different approaches to the proposed solution, comparing the use of non-specific safety components, safety relays and safety PLCs. They must carry out the practical implementation on a physical production station.

The developed work should cover all the steps to obtain a complete solution: Risk calculation, selection of components, physical installation of the different elements, secure controller programming, etc.

Full-or-part-time: 75h

Theory classes: 27h

Self study : 48h

GRADING SYSTEM

Laboratory test (individually):

20% Project results (in group): 50%

Report delivery and oral presentation of the adopted solution to solve the challenge: 30%

BIBLIOGRAPHY

Basic:

- PILZ user manuals, PILZ programming guides, PASCAL (PILZ) [on line]. [Consultation: 14/11/2022]. Available on: <https://www.manualshelf.com/manual/pilz/pnoz-s1-c-24vdc-2-n-o/user-manual-english.html>.