

Course guide

205202 - SPAA - Highly Automated Production Systems

Last modified: 02/04/2024

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

Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Rita Maria Planas Dangla

Others: Jan Pascual Alsina

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 (8-10 students) will use the new concepts to specify its solution in order to solve the laboratory tasks. In the lab sessions, teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning.

Students will be able to be comfortable working on a Highly Automated Production System and must be able to implement a correct solution in order to obtain the complete and correct operation of the system consisting of a small flexible production line composed by 4 different stations emulating an Industrial task. At lab, students will work in groups (8-10 students), in order to promote contact and use the basic tools needed to solve problems.

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 of a Highly Automated Systems real case study. The applications must be proposed by lecturers and includes a different set of technologies all of them often used in industrial environments (PLCs, OPC, SCADA systems, Industrial Robots, Industrial Communications, Vision Systems, User Interfaces, etc.). Applications will be developed by groups (8-10 students) and 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
Hours large group	30,0	40.00
Self study	45,0	60.00

Total learning time: 75 h

CONTENTS

Module 1: Manufacturing processes:

Description:

Basics of industrial Automation Systems.

Flexible manufacturing Systems (FMS):

- * FMS definition,
- * Need of FMS,
- * General FMS considerations,
- * Types of FMS,
- * Just In Time.

Related activities:

Working in groups, to decide the right data structure in order to automatize a small FMS composed by 4 different stations.

Full-or-part-time: 12h 30m

Theory classes: 5h

Self study : 7h 30m

Module 2: FMS Components

Description:

Composition of FMS:

- * hierarchy of computer control
- * Control software and Hardware components.
- * PLCs
- * System Communications
- * Automated material movement (AGVs) and automated storage and retrieval systems (Highly automated warehouses)
- * Automated Inspection Systems
- * Safety components and Safety automation

Related activities:

Working in groups, to realize the right control automation of each one of the fourth FMS line, including the artificial vision process, and a MMI (Man Machine Interface) as a user interface and interaction panel.

Full-or-part-time: 37h 30m

Theory classes: 15h

Self study : 22h 30m



Module 3: DataBases and Data Collectors

Description:

CIM Database and Database Management Systems:

- * DDBB Types,
- * Management Information System,
- * Manufacturing data collection systems
- * Reporting
- * KPIs

Related activities:

Working in groups, to configure system communications and realize the right data base implementation in order to extract different reports related with the production of the FMS automatized line.

Full-or-part-time: 25h

Theory classes: 10h

Self study : 15h

GRADING SYSTEM

Laboratory test (individually): 20%

Project results (in group): 50%

Small project modification (individually): 30%