Universidad Europea VALENCIA

1. OVERVIEW

Subject area	Smart and Connected Industry
Degree	Bachelor's Degree in Industrial Organisation Engineering
School/Faculty	Faculty of Science, Engineering and Design
Year	Third-party
ECTS	4.5 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery Mode	On campus
Semester	First semester

2. INTRODUCTION

The Smart and Connected Industry subject is one of the compulsory parts in the Degree in Industrial Organisation Engineering syllabus at the Universidad Europea de Valencia. This subject is one of the traditional guiding principles in the learning process for future engineers as it provides an outlook on the current world of industry and the latest technologies.

After studying Introduction to Engineering and Industrial Automated Systems, students will learn here all about the latest technology which has had an impact on industry and how it is used both in business management and planning.

Throughout this subject area, students will delve into the world of technology and see how they work with examples and case studies from the professional world and business ecosystems.

Smart and Connected Industry allows students to evaluate, choose and recognise the new trends in industry technology and subsequently implement it in their professional careers.

This subject is theory based with a high level of professional exposure and contact with real cases in businesses which are currently implementing these technologies in the industrial sector.

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):
- CB2 - Students can apply their knowledge to their work or vocation in a professional manner and possess the skills which are usually evident through the forming and defending of opinions and resolving problems within their study area.
- CB4. Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5 - Develop the learning skills necessary to undertake further study in a much more independent manner.

Cross-curricular skills (CT, by the acronym in Spanish):

- CT1 - Ethical values: ability to think and act in line with universal principles based on the value of a person, contributing to their development and involving commitment to certain social values.
- CT2 - Independent learning: skills for choosing strategies to search, analyse, evaluate and manage information from different sources, as well as to independently learn and put into practice what has been learnt.
- CT3 - Teamwork: ability to integrate and collaborate actively with other people, areas and/or organisations to reach common goals.
- CT4 - Written/spoken communication: ability to communicate and gather information, ideas, opinions and viewpoints to understand and be able to act, spoken through words or gestures or written through words and/or graphic elements.
- CT5 - Analysis and problem-solving: be able to critically assess information, break down complex situations, identify patterns and consider different alternatives, approaches and perspectives in order to find the best solutions and effective negotiations.
- CT6. Adapting to change: be able to accept, consider and integrate different perspectives, adapting your own approach as required by the situation at hand, and to work effectively in ambiguous situations.
- CT8 - Entrepreneurial spirit: ability to take on and carry out activities that generate new opportunities, foresee problems or lead to improvements.

Specific skills (CE, by the acronym in Spanish):

- CE08 - Ability to use basic knowledge of production and manufacturing systems in industrial organisation processes.
- CE13 - Ability to apply design and management techniques and tools to control production and operations in industrial organisation.
- CE14 - Ability to apply knowledge of quality and environmental management systems in the field of industrial organisation engineering.
- CE18 - Ability to organise, complete and defend a project in the field of industrial organisation engineering.

Learning outcomes (RA, by the acronym in Spanish):

- RA4 - Solve assignment and transport issues, problems in the decision-making process, and manage inventories and queue management.
- RA6 - Design and put into action engineering projects.
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- RA8 - Apply the principles of a smart and connected industry to an industrial organisation.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes (RA, by the acronym in Spanish)
CB2, CB4, CT2, CT3, CT4, CT5, CT8, CE8, CE13, CE14, CE18	**RA4.** Solve assignment and transport issues, problems in the decision-making process, and manage inventories and queue management.
CB2, CB4, CB5, CT1, CT2, CT3, CT4, CT5, CT8, CE8, CE13, CE14, CE18	**RA6.** Design and put into action engineering projects.
CB2, CB4, CB5, CT1, CT2, CT3, CT4, CT5,	**RA8.** Apply the principles of a smart and connected industry to an industrial organisation.

CT8, CE8, CE13, CE14, CE18	

4. CONTENTS

The subject area is divided into 6 learning units, which are then divided into topics (four to five topics depending on the unit):

Unit 1. Introduction to the smart and connected industry
Unit 2. Logistics 4.0. A new impulse
> Knowledge of new industry trends for smart management of goods movement and innovative localisation and traceability systems.

Unit 3. New software. No-code. Create your access to information
> The new way to create software in industry with no programming knowledge allows engineers to take complete control of projects thanks to the new smart industry.

Unit 4. VR, AR, XR in the new smart industry
> VR, AR and/or XR are digital environments which interact with real ones to create a new virtual world which complements the real one or can even replace it. Experts predict this to be one of the next industrial revolutions.

Unit 5. Deep learning / machine learning and artificial intelligence
> Algorithms and software are allowing us to store, manage and process an increasing amount of information and in a smarter way. This unit is based on deep learning and teaches us to apply artificial intelligence algorithms to get the most out of this information.

Unit 6. Dashboarding and business intelligence.
> When we apply artificial intelligence to business management we talk about Business Intelligence. When we unite this with a powerful Dashboard, we can provide industry managers with very advanced tools to optimise and significantly improve their business.

Unit 7. IoT, networks and communication - LoraOne, 5G, etc.
> As the Internet of Things is revolutionising industry, it allows us to access all types of information.

Unit 8. Artificial vision in the new industry
> The evolution of artificial vision has made it an essential tool in robot guidance, defect control, poka-yoke systems and quality control. When it is joined with artificial intelligence it can become an even more useful tool for the new industry.

Unit 9. Architecture of databases. Big Data
> The structure of a database is very important when it has to handle a vast quantity of entries. BigData is a challenge for any IT infrastructure.

Unit 10. BlockChain in the Industry 4.0
> Guaranteeing the security of the data along the entire chain is as important as the chain itself. We see how blockchain can revolutionise the industry and see how it allays fears regarding our data.

Unit 11. Cybersecurity in the smart industry
> Cybersecurity is currently vital in smart industry. Its growth and development is creating space for free development in this industry.

Unit 12. The engineer in the smart industry
> We learn about the role of engineers in this industry and how they can realise their full potential.

Unit 13. Business management through the smart industry
> We will learn about the benefits smart and connected industry offers businesses and how this leads to a competitive advantage in any sector.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:
- Master lectures
- Collaborative learning
- Problem-based learning
- Case study
- Gamification
- Field work (field trips, work experience)

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

Learning activity	Number of hours
Master lecture and seminars.	19.3
Problem-solving	11.8
Case studies and field studies	5.4
Laboratory work	18.2
Debates and discussions	6.0
Learning contract (definition of interests, needs and objectives)	1.5
Autonomous learning	43.5
Tutorials	5.3
Knowledge tests	1.5
TOTAL	**112.5**

7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:

On campus:

Assessment system	Weighting
Attitude assessment tests (attitude assessment rubrics, class participation)	10%
On Campus tests to evaluate objectives of theory/practical learning (exam-type objective tests, written compositions, oral presentations, case studies/problem solving, debates, simulation tests)	40%
Off-site tests to assess theory/practical learning (case studies/problem-solving)	40%
Self- and co-assessment (learning contract, learning objectives)	10%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

8. BIBLIOGRAPHY

The reference publications to accompany this subject are:

- Industria 4.0: Conceptos, tecnologías habilitadoras y retos (Empresa y Gestión) (Enrique ROdal Montero) Editorial Piramide
- La Meta: Un proceso de Mejora Continua (Elijyahu M Golddratt y Jeff Cox) Editorial Goldratt1 Ltd.
- Inteligencia Artificial (Emilio Soria) Editorial Ra-Ma SA
- Business Intelligence Guidebook: From Data Integration to Analytics (Rick Sherman)
- Editorial Morgan Kaufmann
- Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies (Imran Bashir) Packt Publishing
- Industria 4.0: Conceptos, tecnologías habilitadoras y retos (Empresa y Gestión) (Enrique ROdal Montero) Editorial Piramide