1. OVERVIEW

Subject area	Quality and Environmental Management
Degree	Bachelor's Degree in Data Science
School/Faculty	Faculty of Science, Engineering and Design
Year	4º
ECTS	6
Type	Optional
Language(s)	Spanish
Delivery Mode	On campus
Semester	Second

2. INTRODUCTION

Industry has a significant impact on the environment and on society. Sustainability implies a balance between economic growth, environment protection and social well-being. Engineers are responsible for designing and creating sustainable solutions which meet current needs without compromising the ability of future generations to do the same. Therefore, they must apply measures which reduce the consumption of natural resources, use renewable energy sources, develop clean technologies and promote responsible business practice.

Environmental management allows engineers to identify, evaluate and manage the environmental impact of their activities. This field involves applying measures to reduce carbon footprint, minimise air and water pollution, and guarantee correct waste management. Environmental policy also helps businesses meet environmental regulations and enhance their reputation among consumers.

Finally, quality management is a key factor in achieving customer satisfaction and a competitive business. Engineers must ensure that the products and service they design and build meet standards of quality and safety and are reliable. To this end, they must implement quality control systems, carry out tests and trials, and continuously evaluate the performance of products and services.

3. SKILLS AND LEARNING OUTCOMES

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

- **CE15** - Ability to apply technological and innovative strategies as a way to grow, develop and improve a company's competitiveness.

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

After passing the subject area students will be able to:

- **RA1:** Implement quality control systems and continuous development plans.
- **RA2:** Carry out environmental and social impact studies for projects and activities.

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

Skills	Learning outcomes
CE15	RA1, RA2

4. CONTENTS

The following topics will be covered in this subject area:

UNIT 1: Sustainability

- The concept of sustainability
- Historical socio-economic context, globalisation
- Main environmental issues, climate change
- Sustainability analysis

UNIT 2: Environmental Engineering

- Life-cycle analysis, carbon footprint
- Fundamentals of environmental engineering - how industry pollutes the air, water and atmosphere
- How to prevent and treat pollution - Waste management.

UNIT 3: Quality and environmental management systems

- Quality management principles;
- quality management systems; quality standards: ISO 9000, 14000, EFQM; building a quality management system; integrated management of quality, environment and safety (ISO 9001, ISO 14001, ISO 45001)
- Quality management techniques

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Master lectures
- Case studies
- Collaborative learning
- Problem-based learning
- Project-based learning
- Learning based on laboratory work (laboratory, workshop and simulated environments)
- Gamification
- Field work (field trips, professional talks, 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 lectures and practical seminars	42
Problem-solving	8

Case studies and field studies	13
Debates and discussions	8
Learning contract (definition of interests, needs and objectives)	2
Autonomous learning	68
Tutorials	7
On campus knowledge tests	2
TOTAL	**150**

7. ASSESSMENT

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

Assessment system	Weighting
On campus tests to evaluate objectives of theory/practical learning (exam-type objective tests, written compositions, spoken presentations, case studies/problem solving, debates, simulation tests)	55%
Off-site tests to assess theory/practical learning (case studies/problem solving)	25%
Attitude assessment tests (attitude assessment rules, class participation)	10%
Self- and co-assessment (learning contract, learning outcomes)	5%
Laboratory, workshop or simulation tests (activity reports, spoken presentations)	5%

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 publication to accompany this subject area is:

- Calvo A. (2021). Estrategia medioambiental y desarrollo sostenible. Madrid editorial Universitaria Ramón Areces
- Cucarella, V. (2018) Economía para un futuro sostenible. Alzira Algar.
- Sannella, A.; Nocenzi, M. (2020). Perspectives for a New Social Theory of Sustainability. First Springer International Publishing, 2020.

The recommended bibliography is indicated below:

- Doménech, J.L (2009) Huella ecológica y desarrollo sostenible. AENOR Ediciones.
- Garmendia (2005). Evaluación de impacto ambiental. Pearson Prentice Hall.
- Martínez-Prado, M. A. (2015) Ingeniería ambiental: ecología, prevención y control de la contaminación del aire, agua y suelo, tendencias de la ingeniería ambiental. Editorial Académica Española.

- Kiely, G. (1999) Ingeniería ambiental: fundamentos, entornos, tecnologías y sistemas de gestión. Ed. Mc graw-Hill.
- Conesa, V. (2006) Guía metodológica para la evaluación del impacto ambiental. Ed. Mundi Prensa.
- Camison, C; Cruz, S.; Gonzalez, T. (2006). Gestión de calidad, conceptos, enfoque, modelos y sistemas. Pearson.
- Claver, E.; molina, J.F.; Tarí, J.J. (2011) Gestión de la calidad y gestión medioambiental. Ed. Pirámide.
- Abril Sánchez, C. E.; Enríquez Palomino, A.; Sánchez Rivero, J. M. (2012) Guía para la integración de sistema de gestión: calidad, medio ambiente y salud en el trabajo. Fundación Confemetal.