

Course guide

220114 - CTMA - Environmental Science and Technology

Last modified: 26/04/2024

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 758 - EPC - Department of Project and Construction Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Gangolells Solanellas, Marta
Lopez Grima, Victor

Others: Gangolells Solanellas, Marta
Lopez Grima, Victor
Sedo Beneyto, Elena

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE16-INDUS. Basic knowledge and application of environmental technologies and sustainability. (Common module in the industrial branch)

Transversal:
2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

TEACHING METHODOLOGY

The course is organized as follows:

- Presencial sessions of contents exhibition (theory)
- Presencial sessions of practical work (practices)
- Autonomous work of study

LEARNING OBJECTIVES OF THE SUBJECT

Provide students with necessary theoretical and practical knowledge:

- To be able of detecting, proposing, analysing, modelling, taking decisions and solving problems in social areas, economic and environmental.
- To know and use tools and technologies to act in the direction of the sustainability.
- To know and use tools and more sustainable technologies.
- To be able of developing a respectful technology with the environment.
- To know different environmental technologies and their applications in the engineering.

STUDY LOAD

Type	Hours	Percentage
Hours small group	28,0	18.67
Self study	90,0	60.00
Hours large group	32,0	21.33



Total learning time: 150 h

CONTENTS

Module 1: Introduction to environmental problems associate with the industry

Description:

- 1.1 Introduction and historical references
- 1.2 Main environmental problems

Related activities:

Activity 1. Case study "Main environmental problems"

Full-or-part-time: 13h 30m

Theory classes: 4h

Laboratory classes: 2h

Self study : 7h 30m

Module 2: Sustainability concept and indicators

Description:

- 2.1 Sustainability concept
- 2.2 Sustainability indicators

Related activities:

Activity 2. Case study "Sustainability indicators".

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 3: Lifecycle analysis

Description:

- 3.1 Concept of Life Cycle Assessment
- 3.2 Regulatory framework
- 3.3 Description of the methodology of Life Cycle Assessment

Related activities:

Activity 3. Case study "Life Cycle Assessment"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 4: Environmental management systems in industry

Description:

- 4.1 Introduction to Environmental Management Systems
- 4.2 Regulatory framework of Environmental Management Systems
- 4.3 Implementation process of an Environmental Management System
- 4.4 Audit of an Environmental Management Systems and verification / certification of the system
- 4.5 Communication and environmental information
- 4.6 Integrated Management Systems

Related activities:

Activity 4. Case study "Environmental Management Systems"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 5: Prevention and control of industrial activities

Description:

- 5.1 Industrial emissions directive about integrated prevention and control of pollution, best available techniques, emission limit values
- 5.2 Reference documents
- 5.3 Law about prevention and control of activities, classification of activities and administrative procedures
- 5.4 Register of Emission and Pollutant Transfers

Related activities:

Activity 5. Case study "Prevention and control of activities"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 6: Atmospheric pollution: climatic change

Description:

- 6.1 Climate change and climatic variations
- 6.2 Potential climate change impacts
- 6.3 Strategies to tackle climate change

Related activities:

Activity 6. Case study "Climate change"

Full-or-part-time: 15h 30m

Theory classes: 4h

Laboratory classes: 4h

Self study : 7h 30m

Module 7: Atmospheric pollution: air quality

Description:

- 7.1 Air quality
- 7.2 Pollutants emissions into the atmosphere
- 7.3 Atmospheric processes
- 7.4 Industrial emissions and emissions control techniques
- 7.5 Legislation related to emissions and air quality

Related activities:

Activity 7. Cas study "Emissions into the atmosphere and air quality"

Full-or-part-time: 13h 30m

Theory classes: 4h

Laboratory classes: 2h

Self study : 7h 30m

Module 8: Enegy and environment

Description:

- 8.1. Energy production and consumption
- 8.2. Environmental impacts associated to energy production and consumption. Indicators
- 8.3. Strategies to reduce environmental impacts associated to energy
- 8.4. Energy management systems and energy audits

Related activities:

Activity 8. Case Study "Analysis of environmental indicators related to energy production and consumption"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 9: Industrial residues management

Description:

- 9.1. Classification, coding and management methods for industrial waste
- 9.2. Prioritization of waste management channels
- 9.3. Legislation related to industrial waste management
- 9.4. Administrative procedures for industrial waste management

Related activities:

Activity 9. Case study "Industrial waste management"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 10: Water management

Description:

- 10.1. Sustainable water management in industry
- 10.2. Strategies to minimize water consumption and pollution
- 10.3. Industrial wastewater treatment systems
- 10.4. Administrative procedures for water management

Related activities:

Activity 10. Case study "Management of industrial wastewaters and associated costs"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 11: Acoustic pollution

Description:

- 11.1. Noise characteristics
- 11.2. Noise propagation and transmission
- 11.3. Legislation for the protection of workers
- 11.4. Environmental noise legislation

Related activities:

Activity 11. Case Study "Noise pollution management in an industrial management"

Full-or-part-time: 11h 30m

Theory classes: 2h

Laboratory classes: 2h

Self study : 7h 30m

Module 12: Environmental impact evaluation

Description:

- 12.1. Environmental impacts associated with projects
- 12.2. Environmental management tools
- 12.3. Strategic environmental assessment
- 12.4. Environmental impact assessment
- 12.5. The environmental impact study, the environmental monitoring plan and the environmental impact declaration

Related activities:

Activity 12. Case Study "Environmental impact assessment of a project"

Full-or-part-time: 15h 30m

Theory classes: 4h

Laboratory classes: 4h

Self study : 7h 30m

GRADING SYSTEM

The evaluation system is structured in 4 evaluable elements:

- Theory Exam 1st part of course: 35%
- Practices Tests 1st part of course: 15%
- TheoryExam 2nd part of course: 35%
- Practices Test 2nd part of course: 15%

Non-satisfactory results in the exam of the first part or in the exam of the second part will be able to be redirected by means of a written test that will take place the day of the final exam. Non-satisfactory results in the practices test may be retaken on the day of the final exam. All the students can take this tests. Marks in the reset tests can range from 0 to 10. Only the best mark between the reset exam and the first attempt (exam for the first part + exam for the second part) will be taken into account.

BIBLIOGRAPHY

Basic:

- International Standard Organization. ISO 14001:2015: Environmental management systems: requirements with guidance for use. 2015.
- International Standard Organization. ISO 14040:2006: Environmental management: life cycle assessment: requirements and guidelines. 2006.
- Tchobanoglous, George. Wastewater engineering: treatment and resource recovery [on line]. 5th ed. New York: McGraw Hill, 2014
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<https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5662641>. ISBN 9780073401188.
- Coley, David A. Energy and climate change: creating a sustainable future [on line]. Chichester: John Wiley and Sons, 2008
[Consultation : 06/09/2024]. Available on :
https://search-ebscohost-com.recursos.biblioteca.upc.edu/login.aspx?direct=true&AuthType=ip,uid&db=nlebk&AN=323301&site=ehost-live&ebv=EB&ppid=pp_C1. ISBN 9780470853139.

RESOURCES

Other resources:

Slides available on Atenea.