Course guide
2400196 - 240MEI49 - Environmental Impact Minimisation in Industry

Last modified: 04/07/2025

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: **Degree:** MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2025). (Optional subject).

Academic year: 2025 **ECTS Credits:** 7.5 **Languages:** English

LECTURER

Coordinating lecturer: Rosa Mari Darbra Roman

Others: Jordi Bou
María Pilar Almajano
Albert Soret
Eva Gallego

REQUIREMENTS

No prerequisites

TEACHING METHODOLOGY

Expositive and participative lectures
Classroom and laboratory practices
Project-based learning: problems and cases (final work)
Visits to chemical industries
Seminars
Self-study

LEARNING OBJECTIVES OF THE SUBJECT

1. Introduce the student to the minimization of environmental impacts in industry from different aspects: management, sustainable packaging or pollution reduction, among others.
2. Define the importance of management systems within the industrial framework, especially those of an environmental nature
3. Apply the methodology that determines the implementation of an environmental management system in any organization.
4. Evaluate the benefits obtained by implementing a quality management system in a business organization.
5. Identify the regulatory requirements that a company must manage from the point of view of the safety of its workers, its facilities and its environment.
6. Acquire a global vision of the integration of all management systems of an organization.
7. Be able to develop strategies to design sustainable food packaging and respect legislation regarding its recycling and labeling. Explain the different types of packaging and their properties.
8. Analyze the different methodologies for extracting antioxidants of waste coming from rnatural products as well as their characterization
9. Develop the scientific and technical criteria to define an environmental pollution system with physical, chemical and thermodynamic data.
10. Define and relate the scientific bases of climate change to have the appropriate criteria to work, disseminate or research on this topic.
11. Use and apply technical tools to solve environmental pollution problems.

CONTENTS

Chapter 1. Introduction

Description:
Laying the foundations for minimizing environmental impacts in industry

Specific objectives:
1

Related activities:
Expositive and participative lectures (1h)
1 paper to read at home

Full-or-part-time: 3h
Theory classes: 1h
Self study : 2h

Chapter 2. Management Systems

Description:
Management systems concept. Standards. Certificates.

Specific objectives:
2

Related activities:
Participative and expositive lectures (3h)
Papers and other documentation to reat at home related to the introductory concepts.

Full-or-part-time: 9h
Theory classes: 3h
Self study : 6h

Chapter 3. Environmental Management Systems

Description:
Environmental Management System elements. ISO 14001 and EMAS.

Specific objectives:
3

Related activities:
Expositive and participative lectures (6h)
1 practical class on environmental management (2h)
1 expert seminar (1h)

Full-or-part-time: 29h
Theory classes: 7h
Practical classes: 2h
Self study : 20h

Chapter 4. Other management systems and its integration

Description:
Quality and Safety management systems. Management System integration

Specific objectives:
4, 5 and 6

Related activities:
Expositive and participative lectures (6h)
1 practical class on safety management (2h)
1 industry visit (3h)
1 session to present the final work (3h)

Full-or-part-time: 34h
Theory classes: 12h
Practical classes: 2h
Self study : 20h

Chapter 5. Sustainable food packaging

Description:
Influence on food durability, recycling criteria and reuse. Labelling standards. Nutriescore

Specific objectives:
7

Related activities:
Expositive and participative lectures (3,5h)
1 practical class (2h)

Full-or-part-time: 17h 30m
Theory classes: 3h 30m
Practical classes: 2h
Self study : 12h

Chapter 6. Recovery and reuse of agri-food waste

Description:
Analysis of alternatives to obtain high value-added products from agri-food waste at an affordable price. Explanation of the different extraction methodologies and uses.

Specific objectives:
8

Related activities:
Expositive and participative lectures (3h)
1 Practical class (2h)
1 Visit (3h)

Full-or-part-time: 20h
Theory classes: 6h
Practical classes: 2h
Self study : 12h

Chapter 7. Chemical, physical and thermodynamic aspects of the atmosphere

Description:
Description of the atmosphere. Chemical composition. Description of pollutants. Hydrodynamics of the atmosphere. Thermodynamics of the atmosphere: thermal gradient.

Specific objectives:
9

Related activities:
Expositive and participative classes (6h)
1 Practical class (2h)
1 Visit (2h)

Full-or-part-time: 26h
Theory classes: 8h
Practical classes: 2h
Self study : 16h

Chapter 8. Climate Change and Greenhouse Effect

Description:
Evidence of climate change. Theories of climate change. Greenhouse effect: evolution of the concept. Scientific basis of the greenhouse effect: theories. Future forecasts.

Specific objectives:
10

Related activities:
Expositive and participative lectures (6h)
1 Visit (2h)

Full-or-part-time: 24h
Theory classes: 8h
Self study : 16h

Chapter 9. Atmospheric pollutants

Description:
New generation pollutants, Particulate pollution, Indoor pollution

Specific objectives:
9

Related activities:
Expositive and participative lectures (6h)
1 Visit (1h)
1 Practical class (2h)

Full-or-part-time: 25h
Theory classes: 7h
Practical classes: 2h
Self study : 16h

GRADING SYSTEM

10% Continuous assessment tests
25% Practical classes
10% Visits and seminars reports
40% Final work and presentations
15% Exams

EXAMINATION RULES.

You will not be able to bring your notes neither at the continuous evaluation tests nor the exams.

BIBLIOGRAPHY

Basic:
- ISO. A practical guide. ISO 14001:2015 Environmental Management Systems. Switzerland, 2017. ISBN 978-1315333731.
- Itay Abuhav. A Complete Guide to Quality Management Systems. CRC Press, 2017. ISBN 978-1315333731.
- Mehrdad Soltanifar. ISO 45001 Implementation. How to Become an Occupational Health and Safety Champion. Productivity Press, 2022. ISBN 9781032210544 .
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- Laboy, Eddie Nelson. Environmental management, sustainable development and human health [Recurs electrònic] . Boca Raton ; London : CRC Press, 2009. ISBN 978-0-415-46963-0.
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- Seinfeld, John H; Pandis, Spyros N. Atmospheric chemistry and physics : from air pollution to climate change . Third edition. Hoboken, New Jersey : John Wiley & Sons, 2016. ISBN 9781118947401.
- Jacobson, Mark Z. . Atmospheric pollution : history, science, and regulation. Cambridge, UK ; New York: : Cambridge University Press, 2002. ISBN 0521811716.
- Perry, Robert H; Green, Don W; Maloney, James O. Manual del ingeniero químico . 4ª ed. Madrid [etc.] : McGraw-Hill, cop. 2001. ISBN 8448130081.
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