



## Course guide

# 820019 - TMS - Environmental Technologies and Sustainability

Last modified: 02/03/2026

**Unit in charge:** Barcelona East School of Engineering  
**Teaching unit:** 717 - DEGD - Department of Engineering Graphics and Design.  
748 - FIS - Department of Physics.  
713 - EQ - Department of Chemical Engineering.

**Degree:** BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Compulsory subject).  
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).  
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Compulsory subject).  
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).  
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

**Academic year:** 2025    **ECTS Credits:** 6.0    **Languages:** Catalan, Spanish, English

### LECTURER

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**Coordinating lecturer:** OLGA ALCARAZ SENDRA - BARBARA SUREDA CARBONELL

**Others:**

Primer quadrimestre:  
FRANCO HERNAN GOMEZ - Grup: M11, Grup: M12, Grup: T11, Grup: T12  
IRENE LÓPEZ PEÑA - Grup: M11  
JAVIER SERRANO VÁZQUEZ - Grup: T11, Grup: T12  
GEMMA TEJEDOR PAPELL - Grup: M12

Segon quadrimestre:  
OLGA ALCARAZ SENDRA - Grup: T21, Grup: T22  
MACARENA ANTONUCCI HIDALGO - Grup: M12, Grup: M21, Grup: M42, Grup: M61  
MANEL BALFEGÓ BRULL - Grup: M11  
ELSA MARGAUX GIFFARD - Grup: T11  
BORIS LAZZARINI - Grup: M11, Grup: M12, Grup: M21, Grup: M22, Grup: M51, Grup: M52, Grup: M62  
IRENE LÓPEZ PEÑA - Grup: M32, Grup: M71, Grup: M72  
PEDRO LOSANTOS VIÑOLAS - Grup: M12, Grup: T11, Grup: T12  
EDDY JOHANNA MARTINEZ DIAZ - Grup: M21, Grup: M42, Grup: M51, Grup: M61  
ROSA MARIA NAVARRO BARBERO - Grup: M22, Grup: M41  
JAVIER SERRANO VÁZQUEZ - Grup: T21, Grup: T22  
BARBARA SUREDA CARBONELL - Grup: M31, Grup: M32, Grup: T12  
GEMMA TEJEDOR PAPELL - Grup: M31, Grup: M41, Grup: M42, Grup: M61, Grup: M62, Grup: M72

### PRIOR SKILLS

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None

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

2. Understand the basic applications of environmental technologies and sustainability principles.

**Transversal:**

1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

**TEACHING METHODOLOGY**

Individual and / or group work, cooperative learning, viewing of documentaries, guided exercises, case studies (carried out in person and not in person).

Transparencies published weekly in ATENEA with locution of the part of theory. Students will have to listen and analyze them before going to class (1 hour of weekly non-contact theory work). In face-to-face theory class (1 hour of face-to-face work per week in the classroom), the content of the presentations will be worked on through specific exercises in small groups. The groups will be communicated to the students on the first day of theory class.

The practices are 2 hours, face-to-face and weekly.

Carrying out tests and examinations.

Submission of exercises or the dossier after the deadline or by any other means other than Athena will not be accepted.

**LEARNING OBJECTIVES OF THE SUBJECT**

- To give students an overview of the state of the world that focuses on limitations and imbalances.
- To analyse the concept of sustainable development and develop the ability to apply it in engineering.
- To make students aware of environmental and sustainable technologies and of their applications in the field of engineering: energy, transport, construction, etc.
- To analyse the role of technoscience and the social and environmental impact of technology.
- To apply the concepts and methods of the sustainability paradigm in the design, implementation, operational and decommissioning stages of any engineering project.
- To analyse existing systems and current and future problems in decision making on a global level.

**STUDY LOAD**

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	30,0	20.00
Hours small group	30,0	20.00

**Total learning time:** 150 h

**CONTENTS**

**0. Course presentation**

**Description:**

- 0.1 Introduction
- 0.2 Teachers
- 0.3 Course objectives
- 0.4 Syllabus
- 0.5 Agenda
- 0.6 Programming Jobs
- 0.7 Bibliography

**Full-or-part-time:** 10h

- Theory classes: 2h
- Practical classes: 2h
- Self study : 6h



## 1. State of the world

### Description:

- 1.1 Ecological phases of mankind
- 1.2 Carrying capacity
- 1.3 The great acceleration; growth and limits to growth
- 1.4 The anthropocene
- 1.5 The globalization

### Specific objectives:

- Understand the problems of the world from a number of perspectives: economic, environmental, cultural, etc.
- Analyse globalisation as it now stands and its relationship with sustainability.

### Full-or-part-time: 50h

Theory classes: 10h

Practical classes: 10h

Self study : 30h

## 2. Sustainable paradigm. Models of development. Sustainable Human Development

### Description:

- 2.1 Sustainable Development concept
- 2.2 Mechanist paradigm vs. systemic paradigm. Complexity
- 2.3 Sustainability examples
- 2.4 Development models
- 2.5 Economics and environmental economy, and social economy

### Specific objectives:

- Analyse the models of development
- Define the concept of sustainable development.
- Analyse the concept of sustainable development and its various interpretations.
- Analyse the application of the concept of sustainable development from industrial, political, social and economic perspectives.
- Understand the methodologies and instruments used to measure sustainable development.

### Full-or-part-time: 40h

Theory classes: 8h

Practical classes: 8h

Self study : 24h



### 3. International organizations and multilateral agenda for 2030

**Description:**

- 3.1 Multilateral international policy
- 3.2 International reports, data and policies
- 3.3 International Agenda

**Specific objectives:**

- Understand the historical evolution of the political agenda and the international organizations.
- Analyze the role of the main international organizations.
- Analyze the multilateral agenda for 2030 and the main international treaties.
- Analyze the existing systems for decision-making at the international level

**Full-or-part-time:** 25h

- Theory classes: 5h
- Practical classes: 5h
- Self study : 15h

### 4. Policies and technologies for sustainability

**Description:**

Methodologies and policies for sustainability. It is a cross-cutting topic that is worked on throughout the semester.

**Specific objectives:**

- Analyze individual and organizations responsibility to achieve sustainability
- Draw up sustainability paradigms in the design of products and the different methodologies that can be applied to them.
- Understand how sustainability paradigms are specified in production processes and apply the various existing methodologies to specific examples.

**Full-or-part-time:** 25h

- Theory classes: 5h
- Practical classes: 5h
- Self study : 15h

## GRADING SYSTEM

Assessment methods: assignments, oral presentations, two examinations (mid-semester and at the end of the year), practical problems and exercises.

Final mark: Mid-term exam= 33%; Final exam= 33%; Theory exercises developed in group in the classes= 13%; Practical dossier= 17%

The practical work assessment mark will be penalised by 0.5 points for each documentary test not completed and 0.3 points for each documentary test failed.

The language of the exams of the course (multiple choice questions) will be Spanish, except for the group in which the classes are in English, which will be in English.



## BIBLIOGRAPHY

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### Basic:

- Xercavins, Josep [et al.]. Desarrollo sostenible [on line]. 2005. Barcelona: Edicions UPC, 2005 [Consultation: 17/06/2020]. Available on: <http://hdl.handle.net/2099.3/36752>. ISBN 8483018055.
- Mendoza Roca, José Antonio [et al.]. Ciencia y tecnología del medio ambiente. 1998. Valencia: Universidad Politécnica. Servicio de Publicaciones, DL 1998. ISBN 8477216894.
- Nebel, Bernard J. Ciencias ambientales : ecología y desarrollo sostenible. 6a ed. México [etc.]: Prentice Hall Hispanoamericana, cop. 1999. ISBN 9701702336.
- Alarcón Jordán, M.; Àvila Castells, A.; Cunillera i Grañó, J. Canvi climàtic : evidències científiques [on line]. Barcelona: Iniciativa Digital Politécnica, 2011 [Consultation: 17/06/2020]. Available on: <http://hdl.handle.net/2099.3/36572>. ISBN 9788476536575.

### Complementary:

- Worldwatch Institute. L'Estat del món ... : informe del Worldwatch Institute sobre el progrés cap a una societat sostenible. Barcelona: Centre Unesco de Catalunya, 199-?-].
- Diamond, Jared M. Colapso : por qué unas sociedades perduran y otras desaparecen. Barcelona: Debate, 2005. ISBN 8483066483.
- Cabeza i Díaz, Rafael. L'Aigua, un recurs universal i escàs : iniciació al tractament i utilització racional de l'aigua. Barcelona: Beta, 1997. ISBN 8470913638.

## RESOURCES

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### Other resources:

<https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/> /> <http://hdr.undp.org/>