

## Course guide

### 480152 - DSPS - Sustainable Design of Products and Services

**Last modified:** 22/05/2025

**Unit in charge:** Barcelona School of Civil Engineering  
**Teaching unit:** 729 - MF - Department of Fluid Mechanics.

**Degree:** MASTER'S DEGREE IN SUSTAINABILITY SCIENCE AND TECHNOLOGY (Syllabus 2013). (Optional subject).

**Academic year:** 2025    **ECTS Credits:** 5.0    **Languages:** English

#### LECTURER

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**Coordinating lecturer:** JORDI SEGALAS CORAL

**Others:** Segalas Coral, Jordi

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

1. The ability to apply the methods and tools used in the management of the industrial manufacturing sector, information and communication technologies and measuring, modelling and simulation systems in the identification, information management, planning, management, execution and assessment of programmes and projects in the fields of industrial engineering and engineering project management.

**Transversal:**

2. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

## TEACHING METHODOLOGY

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The following teaching methods will be used in the development of the course:

Lecture or conference (EXP): Sharing knowledge through lectures by professors or by external guest speakers .

Problem solving and case studies (RP): group decision exercises, debates and group dynamics, with the teacher and students in the classroom; class presentation of an activity carried out individually or in small groups

Theoretical/practical supervised work (TD): classroom activity or exercise of theoretical or practical contents, carried out individually or in small groups, with the advice and supervision of the teacher

Extensive project (PA): learning based in the design, planning and realisation in groups of a complex or extensive project or piece of work, applying and extending knowledge and writing a report on this approach and the results and conclusions

Evaluation Activities (EV)

Training activities:

The following training activities will be used in the development of the course :

Face-to-face

Theoretical classes and conferences (CTC): knowledge, understanding and synthesis of contents presented by the lecturer (professor) or by guest speakers .

Practical classes (CP): participation in group exercises, as well as discussions and group dynamics, with the teacher and other students in the classroom.

Presentations (PS): class presentations of an activity carried out individually or in small groups.

Theoretical/practical work tutorials (TD): carry out in the class an activity or exercise, theoretical or practical in nature, individually or in small groups, with the advice of the professor.

Remote

Carry out an extensive project or piece of work (PA): design, plan and conduct individually or in groups, a complex or extensive project or piece of work, applying and extending knowledge and writing a report on this approach and the results and conclusions.

Autonomous study (EA): study or development of the subject individually or in groups, understanding, assimilating, analysing and synthesising knowledge.

## LEARNING OBJECTIVES OF THE SUBJECT

Get acquainted with sustainable value design and different existing approaches and strategies that focus on the environmental and social aspects of sustainable design.

At the end of this course, the student will:

- Get insights in the presented approaches and how to apply them on an own design project.
- To learn how to apply Design for Sustainability strategies, experience and evaluate their effectiveness.
- Think critically from the analysis, synthesis and evaluation of various alternatives.
- Be sensitive to social and environmental issues from concerns about the environmental impact of the solutions and understanding of the social problems.
- Understand language, understanding English as the language of work and media.
- Self-learning and long life learning.
- Understand the impact that the use of technology has on society that adopts it and the basic principles for a sustainable technology.
- Analyse the material and energy flows that occur in a system (industrial, architectural, urban) and their relationship with the land and resources that sustain it.
- Design, plan, implement and evaluate technology, scientific or management projects in the framework of sustainability.
- Understand the interrelationship of systems as material and energy flows to the environment.

## STUDY LOAD

Type	Hours	Percentage
Hours large group	20,0	15.99
Self study	88,4	70.66
Hours small group	6,7	5.36
Hours medium group	10,0	7.99

**Total learning time:** 125.1 h

## CONTENTS

### Unit 1: Introduction to Design for Sustainability.

#### Description:

Introduction to sustainable design.

### Unit 2: Eco-design.

#### Description:

Introduction to Eco-design Strategy.

#### Related activities:

A1

#### Full-or-part-time: 4h

Theory classes: 4h

### Unit 3: Cradle to Cradle.

**Description:**

Introduction to Cradle to Cradle Strategy.

**Related activities:**

A2

**Full-or-part-time:** 4h

Theory classes: 4h

### Unit 4: Biomimicry.

**Description:**

Introduction to Biomimicry Strategy.

**Related activities:**

A3

**Full-or-part-time:** 4h

Theory classes: 4h

### Unit 5: Product Service Systems.

**Description:**

Introduction to Product Service Systems Strategy.

**Related activities:**

A4

**Full-or-part-time:** 4h

Theory classes: 4h

### Unit 6: Social design.

**Description:**

Introduction to Social design Strategy.

**Related activities:**

A5

**Full-or-part-time:** 4h

Theory classes: 4h

### Unit 7: Design for Sustainable Behaviour.

**Description:**

Introduction to design for sustainable behaviour Strategy.

**Related activities:**

A6

**Full-or-part-time:** 4h

Theory classes: 4h

## ACTIVITIES

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### A1. ECO-DESIGN

**Description:**

Reflection on Eco-design methodology and tools as a Sustainable design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of eco-design. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

### A2. CRADLE TO CRADLE

**Description:**

Reflection on C2C methodology and tools as a Sustainable design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of C2C. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

### A3. BIOMIMICRY

**Description:**

Reflection on Biomimicry methodology and tools as a Sustainable design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of Biomimicry. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

### A4. PRODUCT SERVICE SYSTEMS

**Description:**

Reflection on PSS methodology and tools as a Sustainable design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of PSS. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

#### A5. SOCIAL DESIGN

**Description:**

Reflection on social design methodology and tools as a Social design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of social design. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

#### A6. DESIGN FOR SUSTAINABLE BEHAVIOUR

**Description:**

Reflection on design for sustainable behaviour methodology and tools as sustainable design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of design for sustainable behaviour. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

#### A7. CESEDUPACK

**Description:**

Reflection on social design methodology and tools as a Social design strategy + learning portfolio.

**Specific objectives:**

To know the principles and tools of design for sustainable behaviour. Methodology and case studies.

**Material:**

Lecture readings and scientific papers.

**Delivery:**

Report.

## A8. PROJECT

### Description:

Group work (3/4 students). Implementation of CESEducpack Sustainability approach to a Sustainability problem through sustainability design strategies

### Specific objectives:

Design, plan, implement and evaluate technology, scientific or management projects in the framework of sustainability design

### Material:

Lecture readings and scientific papers, stakeholders interviews, CESEducpack sustainability software.

### Delivery:

Report.

### Full-or-part-time: 45h

Self study: 45h

## GRADING SYSTEM

EV1: Written test (PE). 0%

EV2: Oral test (PO). 10%

EV3: Individual or group coursework (TR). This includes results and reports and their oral presentation. 30%

EV4: Class and laboratory attendance and participation (AP). 0%

EV5: Performance and quality of group work (TG). 60%

## EXAMINATION RULES.

All activities will be uploaded to the ATENEA platform.

The project will be defended and discussed with all students.

## BIBLIOGRAPHY

### Basic:

- Birkeland, J. Design for sustainability: a sourcebook of integrated eco-logical solutions. London ; Sterling, VA: Earthscan Publications, 2002. ISBN 1853838977.

- McLennan, J.F. The philosophy of sustainable design. Green Books, 2006. ISBN 9780974903309.

- Lehmann, S.; Crocker, R. Designing for zero waste: consumption, technologies and the built environment. London ; New York: EarthScan, 2012. ISBN 9781849714341.

- Wimmer, W.; Züst, R. ECODESIGN Pilot : product-investigation-, learning- and optimization-tool for sustainable product development, with CD-ROM [on line]. Boston: Kluwer Academic Publishers, 2001 [Consultation: 08/02/2021]. Available on: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/0-306-48393-9>. ISBN 0306483939.

- Wimmer, W.; Züst, R.; Lee, K-M. ECODESIGN implementation : a systematic guidance on integrating environmental considerations into product development. Dordrecht: Springer, 2004. ISBN 9789048167845.

- McDonough, W.; Braungart, M. Cradle to cradle : remaking the way we make things. London: Vintage, 2009. ISBN 9780099535478.

- Hargroves, K.D.; Smith, M.H. "Innovation inspired by nature Biomimicry". Ecos [on line]. Vol. 129, feb-mar 2006, pp. 27-29 [Consultation: 09/02/2021]. Available on:

[https://www.academia.edu/27639131/Hargroves\\_K\\_Smith\\_M\\_2006\\_Biomimicry\\_Innovation\\_Inspired\\_by\\_Nature\\_CSIRO\\_ECOS?auto=download](https://www.academia.edu/27639131/Hargroves_K_Smith_M_2006_Biomimicry_Innovation_Inspired_by_Nature_CSIRO_ECOS?auto=download).- Sakao, T.; Lindahl, M. (Eds.). Introduction to product/service-system design [on line]. London: Springer London, 2009 [Consultation: 17/03/2021]. Available on: <http://dx.doi.org/10.1007/978-1-84882-909-1>. ISBN 9781848829084.

## RESOURCES

### Other resources:

Circular Design: Learning for Innovative Design for Sustainability: <http://circulardesigneurope.eu/>