

## Course guides

# 250463 - ENGSOSDESE - Sustainability and Development Engineering

Last modified: 06/10/2020

**Unit in charge:** Barcelona School of Civil Engineering  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering.

**Degree:** MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Optional subject).  
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**Academic year:** 2020    **ECTS Credits:** 5.0    **Languages:** Catalan, English, Spanish

### LECTURER

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**Coordinating lecturer:** AGUSTÍ PÉREZ FOGUET

**Others:** AGUSTÍ PÉREZ FOGUET

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

8208. The ability to analyse and interpret the regulation and impact of infrastructure and their repercussions for sustainable development, taking into account economic, environmental, social and cultural factors.

**Transversal:**

8559. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.

8560. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

8561. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

### TEACHING METHODOLOGY

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The course consists of 3 hours per week of classroom activity.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

## LEARNING OBJECTIVES OF THE SUBJECT

Specialization subject in which knowledge on specific competences is intensified.

Knowledge and skills at specialization level that permit the development and application of techniques and methodologies at advanced level.

Contents of specialization at master level related to research or innovation in the field of engineering.

Specialization course in Environmental Engineering and Sustainability in which knowledge in specific competences of the Master in Civil Engineering is intensified. It has knowledge at the level of specialization in Environmental Engineering and Sustainability that must allow the development and application of advanced level techniques and methodologies. Knows master's degree content in the area of sustainable development and relates them to innovation in the field of engineering. Acquires capabilities to integrate requirements of sustainability in the practice of engineering and in the process of technological and social innovation. Know the roles that engineering, science and technology play in local, regional and international development processes, with special emphasis on approaches to sustainability and human development.

## STUDY LOAD

Type	Hours	Percentage
Hours small group	9,8	7.83
Self study	80,0	63.95
Guided activities	6,0	4.80
Hours medium group	9,8	7.83
Hours large group	19,5	15.59

**Total learning time:** 125.1 h

## CONTENTS

### Introduction to development

**Description:**

Approach to the state of the world, governance and organizations.

Development, human rights, and international cooperation.

A1

**Full-or-part-time:** 14h 23m

Theory classes: 5h

Laboratory classes: 1h

Self study : 8h 23m

### Sustainability

**Description:**

A2

Concepts, principles and dimensions.

Systems Ecosystems Ecological economy Global commons

**Full-or-part-time:** 14h 23m

Theory classes: 5h

Laboratory classes: 1h

Self study : 8h 23m



### Science, Technology and Engineering.

**Description:**

Technology and society. Science and environmental technologies and sustainability. Innovation.  
Engineering for development  
Environmental and ecological engineering  
A1

**Full-or-part-time:** 28h 47m

Theory classes: 9h

Laboratory classes: 3h

Self study : 16h 47m

### Sustainable human development

**Description:**

Poverty and basic needs approach.  
Capabilities approach. Other approaches

**Full-or-part-time:** 14h 23m

Theory classes: 6h

Self study : 8h 23m

### Information, Indicators, decisions.

**Description:**

Systems engineering methodologies. Multi-criteria decision making.

**Full-or-part-time:** 7h 11m

Theory classes: 3h

Self study : 4h 11m

### Overview

**Full-or-part-time:** 14h 23m

Laboratory classes: 6h

Self study : 8h 23m

## GRADING SYSTEM

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The mark of the course is obtained 60% from of continuous assessments and 40% from the final exam.

## EXAMINATION RULES.

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Failure to perform continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

## BIBLIOGRAPHY

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### Basic:

- De Vries, B.J.M. Sustainability science. Cambridge: Cambridge University Press, 2013. ISBN 9780521184700.
- Hersh, M.A. Mathematical modelling for sustainable development. Berlin: Springer, 2006. ISBN 9783540242161.
- Sachs, J.D. The age of sustainable development [on line]. New York: Columbia University Press, 2015 [Consultation: 09/11/2020]. Available on: <https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=1922296>. ISBN 9780231539005.
- Davis, M.L.; Cornwell, D.A. Introduction to environmental engineering. 5th ed. New York: McGraw-Hill, 2013. ISBN 9780071326247.
- Dresner, S. The principles of sustainability. 2nd ed. London: Earthscan, 2008. ISBN 9781844074969.
- Greed, C. Introducing planning. London: Continuum, 2004. ISBN 9780826477521.
- Costanza, R.; Cumberland, J.H.; Daly, H.; Goodland, R.; Norgaard, R.B.; Kubiszewski, I.; Franco, C. An introduction to ecological economics. Second edition. Raton, Fla: CRC Press, Taylor & Francis Group, 2015. ISBN 9781566706841.
- Jurin, R.R.; Roush, D.; Danter, J. Environmental communication: skills and principles for natural resource managers, scientists and engineers. 2nd ed. Dordrecht ; London: Springer, 2010. ISBN 9789048139866.
- Manahan, S.E. Environmental science and technology: a sustainable approach to green science and technology. 2nd ed. Boca Raton: CRC/Taylor & Francis, 2007. ISBN 9780849395123.
- Mulder, K. (ed.). Sustainable development for engineers: a handbook and resource guide. Sheffield: Greanleaf, 2006. ISBN 1874719195.
- Sen, A. Development as freedom. Oxford: Oxford University Press, 1999. ISBN 0198297580.
- Weiner, R.F.; Matthews, R.A. Environmental engineering [on line]. 4th ed. Amsterdam: Butterworth Heinemann, 2003 [Consultation: 09/11/2020]. Available on: <https://www.sciencedirect.com/science/book/9780750672948>. ISBN 9780750672948.

### Complementary:

- Shepherd, A.W. Sustainable rural development. Basingstoke, Hampshire: Macmillan Press Ltd. ; St. Martin's Press, 1998. ISBN 0312177631.
- Anand, P.; Pattanaik, P.K.; Puppe, C. (eds.). The handbook of rational and social choice. Oxford: Oxford University Press, 2009. ISBN 9780199290420.
- Arrow, K.J.; Sen, A.K.; Suzumura, K. Handbook of social choice and welfare. Amsterdam: Elsevier, 2002-2010. ISBN 0444829148.
- Riddell, R. Sustainable urban planning: tipping the balance. Malden: Blackwell, 2004. ISBN 140510290X.
- Mitsch, W.J.; Jørgensen, S.E. Ecological engineering and ecosystem restoration. Hoboken, NJ: John Wiley & Sons, 2004. ISBN 047133264X.