

**Interdisciplinary Concepts on Environmental,  
Economic and Social Sustainability**

Code: 43068

ECTS Credits: 15

Degree	Type	Year	Semester
4313784 Interdisciplinary Studies in Environmental, Economic and Social Sustainability	OB	0	A

## Contact

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## Use of Languages

Principal working language: english (eng)

## Teachers

Jordina Belmonte Soler

David Molina Gallart

María Antonia Casellas Puigdemasa

Laura Talens Peiró

Eduard Ariza Sole

Sergio Villamayor Tomás

Carlos Martínez Gasol

Claudio Cattaneo

## Prerequisites

no prerequisites

## Objectives and Contextualisation

This module aims to ensure the interdisciplinarity of environmental studies. Every environmental issue must be tackled considering natural as well as economic and social aspects in order to guarantee a sustainable solution for future generations.

This is why a review of the essential concepts related to the three itineraries of this Master's program is conducted. Altogether, new concepts related to ongoing research conducted at ICTA and partner Departments are introduced. Lastly, topics related to communication and academic diffusion are also to be studied.

This is a module divided between the first and second semester. Nevertheless, as this is an introductory module, most part of the lectures is set in the first semester.

In the first semester the core concepts related to each of the three itineraries are discussed, and lecturers from each of the specialties will take part in the presentations. In this semester a three day fieldwork excursion to Alinyà will be also conducted. This implies that this module contains a considerable workload.

Lectures in the second semester are devoted to topics related to communication and academic diffusion, also related to the Master's Thesis. This is why students are trained in a practical exercise with this specific objective.

## Competences

- Analyse how the Earth functions on a global scale in order to understand and interpret environmental changes on the global and local scales.
- Analyse, summarise, organise and plan projects related to the environmental improvement of product, processes and services.
- Apply knowledge of environmental and ecological economics to the analysis and interpretation of environmental problem areas.
- Apply knowledge of environmental engineering to purification and decontamination in different environments.
- Apply the acquired knowledge and methodologies of environmental, economic and social sustainability to the planning and control of environmental management policies and projects.
- Communicate orally and in writing in English.
- Seek out information in the scientific literature using appropriate channels, and use this information to formulate and contextualise research in environmental sciences.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

## Learning Outcomes

1. Apply a multi-criteria analysis to a system.
2. Communicate orally and in writing in English.
3. Compare and make an objective selection from among the different possible techniques in an industrial process, applying criteria of environmental sustainability.
4. Distinguish the Earth's subsystems and know its interactions.
5. Know the different options for waste treatment.
6. Know the economic tools that can be applied to problems of environmental policy.
7. Know the main systems for purifying water and gases.
8. Know the processes of prevention, re-use, recycling and valorisation of waste.
9. Know the two fundamental tools for evaluation problems: Cost-benefit analysis and multi-criteria analysis.
10. Seek out information in the scientific literature using appropriate channels, and use this information to formulate and contextualise research in environmental sciences.
11. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

## Content

### FIRST SEMESTER

FIRST PART: Tools and methods within industrial ecology

Prof.: Carles Martínez Gassol ([carles@ineditinnova.com](mailto:carles@ineditinnova.com)) and Laura Talens Peiró ([Laura.talens@uab.cat](mailto:Laura.talens@uab.cat))

### Objectives

- Understand Life Cycle Assessment Method
- Understand the application of LCA approach in several standards and certifications applied by public and private sector (e.g., Carbon Footprint for product and organization, Environmental Product Declaration, etc.)
- Understand ecodesign method and its applications in real cases studies
- Understand how ecodesign principles are included in EU policies, and how Ecodesign regulations are linked to other EU strategies as the EU circular economy and EU critical raw material.
- Understand waste management system and its contribution to GHG emissions.

### Contents

1. Development of Life Cycle Analysis (LCA)
  - Introduction to LCA

- Environmental tools

## 2. Case studies

- Development of Ecodesign
- Introduction to eco-design
- Eco-design strategies
- Eco-innovation and Eco-labels
- Use of edTool (Ecodesign software)
- Case study of Ecodesign, led by students

## 3. Ecodesign from a policy context and other related EU policies

- Introduction to EU product policies including EU Ecodesign and EU Ecolabel
- Understand the EU Ecodesign implementation process
- Linkages of Ecodesign to other EU strategies as EU Critical Raw Materials and EU Circular economy
- Case study

## Methodology

Class time: The theory classes will provide the students with the knowledge necessary to understand the application of LCA & Ecodesign tools in the analysis and design of sustainable products.

Work outside the classroom: The eco-design project will be carried out outside the classroom in order to ensure that students have understood theory classes, and to learn how to put concepts in practice.

Group projects: A product will be analyzed to identify the eco-design strategies already applied and to propose the potential new ones that could be used if the product would be hypothetically redesigned. A report including the analysis of the case study product using the information provided in the block and using edTool(R) will be submitted two weeks once the lectures are ended.

Group project: during the block project development many tasks will be done by students:

- Determination of the case study
  - Determination of objectives and scope of the study.
  - Ecodesign and its implementation to EU product policies (EU Ecodesign Directive and EU Ecolabel).
- Analysis of the product selected
  - Analysis of the design of the product
  - Identification of eco-design strategies already applied in the selected product
  - Potential eco-design strategies to be implemented in an hypothetical redesign.
  - Discussion and interpretation of the results.
  - Report configuration

SECOND PART: Introduction to social-environmental sciences: paradigm changes, frontier research, methods and debates

Block 1: Sergio Villamayor-Tomas (sergio.villamayor@uab.cat)

20th of Sept.: Frontiers and paradigm changes in science: the case of Ecological Economics?

The goal of this session is to become familiar with the process through which scientific standards and programs evolve, using the example of ecological economics, a relatively new research field, and one ICTA's research flagships.

25th of Sept.: Three "frontier research" fields in sustainability science: socio-ecological resilience, environmental psychology, and the commons.

The goal of this session is to become acquainted with main concepts associated with three emerging fields in the study of sustainability that illustrate challenges and opportunities of "thinking out of the box"; and to get to know some of the research that is being carried by ICTA-UAB researchers within these fields.

7th of Oct.: Research design and methods in socio-environmental science: challenges and solutions to embrace complexity

The goals of this session is to become familiar with basics of research design and put them under test against the lenses of interdisciplinary and collaborative science; and have a firsthand acquaintance of the challenges of doing multi-methods, interdisciplinary research with an example from a project carried at ICTA-UAB.

14 of Oct.: Transdisciplinary research and activism: what's your take?

The goal of this session is to critically evaluate the concept of transdisciplinary research and related paradigms and confront students with their epistemological and normative positions as current/future researchers/professionals of sustainable development.

Block 2: Claudio Cattaneo (claudio.cattaneo@uab.cat)

Sessions builds on the first 2 introductory sessions (by Sergio Vilamayor) and figures out hot topics in ecological economics that can offer valuable insights to industrial ecology and global change. The general framework of the biophysical limits to growth is then explored with a specific focus on climate change (energy) and extractivism and environmental conflicts (materials)

September 27th: Claudio Cattaneo. Entropy, environment, economics. The biophysical roots of the economic process, the (im)possibility of the circular economy and its implications for growth and social justice.

September 30th: Giorgos Kallis, with Claudio Cattaneo. Introduction to degrowth.

October 9th: Aljosa Slamersack with Claudio Cattaneo. Climate Scenarios and degrowth.

October 11th: Marta Conde with Claudio Cattaneo. Commodity Frontiers & conflicts

THIRD PART: Visit to Alinya Campus

Prof: Jordina Belmonte & David Molina (jordina.belmonte@uab.cat; david.molina@uab.cat)

Alinyà campus is a natural space that the Fundació Catalunya-La Pedrera (FCLP) owns and devotes to teaching and research activities. For more information

<http://fundaciocatalunya-lapedrera.com/ca/content/muntanya-daliny%C3%A0-la-rectoria>

UAB and FCLP signed a contract in 2012 to facilitate the development of activities to UAB members in Alinyà. This campus will offer us the opportunity to learn natural sciences and socio-ecological aspects and to assist to explanations on projects that are being run in the area, at the time that all participants get to know better each other and begin to collaborate and work together.

A detailed agenda on the travel to Alinyà (that will be done by bus and organized by ICTA) and the activities will be provided at the beginning of the Master. The students will be asked to contribute to the expenses of the travel and stay. The amount required will be definitively established by that time and will not exceed 75 €/person.

Aula activities, talks and debates related with the Knowledge and the sustainable use of the local environment. Main speakers: Jordina Belmonte (ICTA & Dept. Animal Biology Animal, Plant Biology and Ecology), David Molina (Dept. Geography), Josep Germain (collaborator at ICTA and link with FCLP), Sílvia Garrigós (FCLP), Xavier Escuté (FCLP) and all master students in the debate.

- Introduction to Alinyà: geomorphology, biodiversity, biogeography.

- Livestock in the Alinyà valley and the management of pastures
- Sustainable use of the local environment and practical interpretation of the landscape from a socioecological perspective. Talk-debate.

Field activities:

- Visit to the "Rectoria" and the "Agrobotiga" (organic food store) in Alinyà (Llobera). Talk-debate about invigorating the economy of Alinyà Valley. Main speakers: Jordina Belmonte (ICTA & Dept. Animal Biology Animal, Plant Biology and Ecology), David Molina (Dept. Geography), Sílvia Garrigós (FCLP) and all master students in the debate.
- Visit to the site of the EU Life Project for CO<sub>2</sub> fixation through an apple plantation combined with other species to increase fixation. Comments on other experimental projects from FCLP. Staff: Xavier Escuté (FCLP).
  - Visit to the supplementary feeding site and presentation of the Project on the reintroduction of the black vulture. Excursion on foot from Alinyà to the "Ermita de Sant Ponç". Staff: FCLP and Jordina Belmonte, David Molina, Josep Germain.

## SECOND SEMESTER

FOURTH PART: Theory and Practice of Interdisciplinarity in environmental science

Prof. Eduard Ariza ([eduard.ariza@uab.cat](mailto:eduard.ariza@uab.cat)).

DAY 1, WEDNESDAY 5 OF FEBRUARY 2019 (15-18 h)

Eduard Ariza

The history and theory of interdisciplinarity in sustainability research

- Philosophical concepts and recent evolution
- The need to clarify hidden assumptions: The reflexive approach
- Sustainability science as a value laden research
- The difficult task of framing of wicked problems
- Epistemological pluralism

Mandatory reading: Lélé, S., and R. B. Norgaard. 2005. Practicing interdisciplinarity. *Bioscience* 55 (11): 967-975

DAY 2, WEDNESDAY 12 OF FEBRUARY 2019 (15-18 h)

Eduard Ariza

The practice of Interdisciplinarity: the intellectual challenge

- Conflictual framings and search for answers
- Mismatches in methods and explanatory models of the epistemic communities
- How does an interdisciplinary project work?

Mandatory reading: Farrell, K., Luzzati, T., and S. van den Hove. 2013. What lies beyond reductionism? Taking stock of interdisciplinary research in ecological economics. In: Farrell, K., Luzzati, T. and S. van den Hove (eds). *Beyond Reductionism: A passion for interdisciplinarity*. Routledge, London.

DAY 3, WEDNESDAY 19 OF FEBRUARY 2019 (15-18 h)

Eduard Ariza

Whole Systems Thinking

- From Environmental and Sustainability Education to Whole Systems Thinking
- Transformative learning theory
- Transformative learning practice

Mandatory reading: Sterling, S.R. 2010. Transformative learning and sustainability: sketching the conceptual ground. *Learning and teaching in Higher Education* 5: 17-33.

DAY 4, WEDNESDAY 26 OF FEBRUARY 2019 (15-18 h)

Eduard Ariza

The practice of Interdisciplinarity: the institutional challenge

- The disciplinary structure of knowledge production institutions
- The rhetoric of interdisciplinarity
- Disincentives/incentives and punishment for interdisciplinary research: funding, evaluation criteria and peer pressure.

FIFHT PART: Communication and academic diffusion, also related to the Master's thesis

Prof. Maria Antònia Casellas ([antonia.casellas@uab.cat](mailto:antonia.casellas@uab.cat))

Purpose and Objectives

The purpose of the course is to introduce students to the fundamentals of writing and presentation in the context of academic work. The main course goal is to help master students with the specific requirements of graduate-level articles, reports, theses and presentations. To this goal, we will specifically work on academic practice of research design, summary-critique, synthesis and presentations.

Topics covered in the class include discussion of Critical/Academic Writing, Papers Structure, Abstracts, Introductions/Conclusions, Literature Review, Evidence, Citation Style, Sources and Quotations, Plagiarism, Academic Sources, and Library Resources. We will also address strategies for presenting information. The course provides opportunities for questions, discussion and exercises.

Content

The assignment requirements of the sessions include:

- 1) Readings: We will do readings of journal articles selected by professor and students. The readings will be discussed in class.
- 2) Short Writings: Throughout the classes students will complete several short writing assignments in class. These pieces will be exercises in employing concepts learned in class/reading, and will be incorporated into the short essays.
- 3) Short Essays: Students will write two individual short essays:
  - (a) The first essay is a Summary-Critique Essay: Students select a book from their fields of study and write a summary and critique of it.
  - (b) The second essay is a Synthesis Essay: Students write an Introduction for a topic they are working on in their fields of study related to a research question.
- 4) Class presentation: Students will present the Book Review Essay under the directions of the professor and will receive feedback from the class.

## Methodology

1. Lectures, problem solving and case studies
2. Case-based learning
3. Presentation and oral exposition of developed research
4. Participation in complementary activities
5. Field trips

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Complementary activities	26	1.04	11
Field trips	80	3.2	3, 2, 8, 4, 11
Final work	65	2.6	10, 2, 6, 11
Lessons	84	3.36	3, 2, 6, 11
Type: Supervised			
Reading papers	40	1.6	10, 11
Reading teaching materials	45	1.8	

## Assessment

The students must obtain a global grade of 5.0. The global rating is the sum of the ratings of each part weighted according to the credits that each of them has. The evaluation of each part is done as follows:

FIRST PART: Tools and methods within industrial ecology

Prof. Carles Martínez Gasol & Laura Talens

Participation in class and activities done in class...25%

Quizzes done in class.....25%

Final project presentation.....50%

The participation grade is composed of:

1. Quizzes (Individual). Each class will begin with a 10-15 minute quiz based on the previous class and the assigned readings. Apart from ensuring a continuous effort from part of the students, this will also motivate them to arrive punctually to class, already in thinking mode. Also included in "participation" are the. Both the quizzes and small presentations have equal weight.
2. Presentations (group). There will be either 2 or 3 presentation assignments during the course.
3. Class activities (group). There will be either 1 or 2 activities during the course, after which the students must be able to communicate results.
4. Final project & its presentation to be announced in class- group.

SECOND PART: Introduction to social-environmental sciences: paradigm changes, frontier research, methods and debates

Prof. Sergio Villamayor-Tomas and Clauddio Cattaneo

In-class quizzes/short essays based on readings and or in-class activities (50%); essay based on readings and in-class content (50%)

THIRD PART: Visit to Alinya Campus

Prof.: Jordina Belmonte & David Molina

Students will follow an evaluation consisting in answering the questions and field exercises that the teachers will provide dealing on the teachings received during the Alinya trip; they can include personal opinions on how to run the management of an environment. Students will have an accorded period of time for preparing and submitting the answers. They will be evaluated from 0 to 10 and the final mark will be the mean of the two (or more) exercises proposed.

FOURTH PART: Theory and practice of interdisciplinarity in environmental science

Prof.: Eduard Ariza

Interdisciplinary project..50%

Final exam.....50%

FIFTH PART: Communication and academic diffusion, also related to the Master's thesis

Prof.: Maria Antonia Casellas

Book review.....50%

Essay - Introduction.....30%

Class Presentation and participation.. 20%

Note: students with limited English skills will be able to do their essays in Catalan or Spanish.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assistance activities and complementary field work	10	20	0.8	10, 3, 2, 7, 8, 5, 9, 6, 11
Attendance and active participation in class	10	5	0.2	1, 2, 8, 5, 9, 6, 4, 11
Defense course assignments	20	10	0.4	2, 11

## Bibliography

Tools and methods within industrial ecology

Guinée, Jeroen (Ed.). 2002. Handbook on Life Cycle Assessment. Operational Guide to the ISO Standards. Sprir

[Methodology of supporting decision-making of waste management with material flow analysis \(MFA\) and consequential life cycle assessment \(CLCA\): case study of waste paper recycling](#). Eva Sevigné-Itoiz, Carles M. Gasol, Joan Rieradevall, Xavier Gabarrell. [Journal of Cleaner Production](#), Volume 105, 15 October 2015, Pages 253-262.

[Life Cycle Assessment of apple and peach production, distribution and consumption in Mediterranean fruit sector](#). Elisabet Vinyes, Luis Asin, Simó Alegre, Pere Muñoz, Carles M. Gasol [Journal of Cleaner Production](#), Volume 149, 15 April 2017, Pages 313-320.

[Life cycle assessment of energy flow and packaging use in food purchasing](#), Esther Sanyé, Jordi Oliver-Solà, Carles M. Gasol, Ramon Farreny, Xavier Gabarrell. [Journal of Cleaner Production](#), Volume 25, April 2012, Pages 51-59.

Introduction to the Eco-Design Methodology and the Role of Product Carbon Footprint Esther Sanyé-Mengual, Raul García Lozano, Ramon Farreny, Jordi Oliver-Solà, Carles M. Gasol & Joan Rieradevall. [Assessment of Carbon Footprint in Different Industrial Sectors, Volume 1](#) pp 1-24- Part of the [EcoProduction](#) book series (ECOPROD) Springer Science+Business Media Singapore 2014.

Introduction to social-environmental sciences: paradigm changes, frontier research, methods and debates

Block 1:

20th of Sept.: Frontiers and paradigm changes in science: the case of Ecological Economics?

Mandatory reading:

Walker, T. C. (2010). The perils of paradigm mentalities: Revisiting Kuhn, Lakatos, and Popper. *Perspectives on Politics*, 8(2), 433-451. (pp. 440-443 are optional).

Optional reading:

Martinez-Alier, J., & Muradian, R. (2015). "Taking stock: the keystones of ecological economics", in J. Martinez-Alier & R. Muradian (eds.), *Handbook of ecological economics*, Edward Elgar Publishing (pp. 1-26).

25th of Sept.: Three "frontier research" fields in sustainability science: socio-ecological resilience, environmental psychology, and the commons.

Mandatory reading (1 out of the 3):

Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science*, 325(5939), 419-422.

Drews, S., & Van den Bergh, J. C. (2016). What explains public support for climate policies? A review of empirical and experimental studies. *Climate Policy*, 16(7), 855-876.

Federici, S. (2011). *Feminism and the Politics of the Commons*. URL: <https://tobh.pw/7ir9hhq1hfz.pdf>

7th of Oct.: Research design and methods in socio-environmental science: challenges and solutions to embrace complexity

Mandatory reading:

Epstein, G., Vogt, J. M., Mincey, S. K., Cox, M., & Fischer, B. (2013). Missing ecology: integrating ecological perspectives with the social-ecological system framework. *International Journal of the Commons*, 7(2), 432-453.

Optional Readings:

Cox, M. (2015). A basic guide for empirical environmental social science. *Ecology and Society*.

Poteete, A. R., Janssen, M. A., & Ostrom, E. (2010). Working together: collective action, the commons, and multiple methods in practice. Princeton University Press. (Chapter 1: Overcoming Methodological Challenges in Social Science Research, pp. 3-38)

14 of Oct.: Transdisciplinary research and activism: what's your take?

Mandatory reading:

Otero, I., Niewöhner, J., Krueger, T., Dogmus, Ö. C., Himmelreich, J., Sichau, C., & Hostert, P. (2017). The position of scientists in transformations of human-environment systems. An inquiry into IRI THESys research practices.

Block 2:

September 27th: Reading:

Georgescu-Roegen, N., 1975. Energy and Economic Myths. Southern Economic Journal, 41(3).  
<http://www.uvm.edu/~jfarley/EEseminar/readings/energy%20myths.pdf>

September 30<sup>th</sup>: Reading:

Kallis, G., et al., 2018. Research on Degrowth, Annual Review of Environment and Resources, 43, 4.1-4.26

October 9<sup>th</sup>: Reading:

Koch, 2015: Climate Change, Capitalism and Degrowth Trajectories to a Global Steady-State Economy. International Critical Thought <http://dx.doi.org/10.1080/21598282.2015.1102078>

Anderson and Peters, 2016. The trouble with negative emissions Science 354 (6309), 182-183. [doi: 10.1126/science.aah4567]

October 11<sup>th</sup>: Required readings:

Patel, R., & Moore, J. W. (2017). Introduction. A History of the World in Seven Cheap Things: A Guide to Capitalism, Nature, and the Future of the Planet. Univ of California Press.

Conde, M. and Walter, M. (2015) Commodity Frontiers (Ch 13) Degrowth. A Vocabulary for a New Era.

Additional readings:

Conde, M. (2017). Resistance to mining. A review. Ecological Economics, 132, 80-90.

Alimonda H., (2015) Mining in Latin America: Coloniality and Degradation, 149-162 In International handbook PE (Bryant (Ed.).

Visit to Alinya Campus

Different authors: Els sistemes naturals de la Vall d'Alinya. Institució Catalana d'Història Natural i Fundació Territori i Paisatge. [http://ichn.iec.cat/Alinya\\_Articles.htm](http://ichn.iec.cat/Alinya_Articles.htm)

Theory and practice of interdisciplinarity in environmental science

Farrell, K., Luzzati, T., and S. van den Hove. 2013. What lies beyond reductionism? Taking stock of interdisciplinary research in ecological economics. In: Farrell, K., Luzzati, T. and S. van den Hove (eds). Beyond Reductionism: A passion for interdisciplinarity. Routledge, London.

Lélé, S., and R. B. Norgaard. 2005. Practicing interdisciplinarity. Bioscience 55 (11): 967-975

Lyll, C: and L.R. Meagher. 2012. A Masterclass in interdisciplinarity: research into practice in training the next generation of interdisciplinary researchers, Futures 44: 608-617.

Max-Neef, M. A. 2005. Foundations of transdisciplinarity. Ecological Economics 53: 5-16.

Sterling, S.R. 2010. Transformative learning and sustainability: sketching the conceptual ground. Learning and teaching in Higher Education 5: 17-33.

Communication and academic diffusion, also related to the Master's thesis

Aarabi P (2008). *The art of lecturing: a practical guide to successful university lectures and business presentations*. Cambridge, UK: Cambridge University Press.

Eco U (2001). *Cómo se hace una tesis: técnicas y procedimientos de estudio, investigación y escritura*. Barcelona: Gedisa.

Feak C. & Swales J. (2009). *Telling a Research Story: Writing a Literature Review*. Ann Arbor, MI: University of Michigan Press.

Glasman-Deal, H (2009). *Science research writing for non-native speakers of English*. London, Hackensack, NJ : Imperial College Press

Holliday A. (2007). *Doing and Writing Qualitative Research*. London: Sage.

Swales J & Feak C. (2012). *Academic Writing for Graduate Students: Essential Tasks and Skill*. 3rd edition. University of Michigan Press.

Waller, V., Farquharson, K, & Dempsey D. Eds (2016). *Qualitative social research: contemporary methods for the digital age*. Los Angeles, Calif: Sage.

Warren C. A. B. & Karner T.X. (2015). *Discovering qualitative methods: ethnography, interviews, documents, and images*. New York : Oxford University Press.

Yin, K. R (1994). *Case Study Research. Design and methods*. London: Sage Publications.