

**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

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: english (eng)

Teachers

Jordina Belmonte Soler
María Antonia Casellas Puigdemasa
Laura Talens Peiró
Carles Barriocanal Lozano
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 essential concepts of interdisciplinary practice and the specialties of Ecological Economics and Global Change are reviewed (a three-day field trip to Alinyà is included). Therefore, it is a module with a considerable teaching participation. The classes of the second semester are dedicated to the specialty of Industrial Ecology and to topics related to communication and scientific dissemination in relation to the Final Master's Thesis (TFM). The format of the TFM is that of a scientific article. So it prepares students, as an exercise in communication and scientific dissemination, in this task.

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

PART 1. Theory and Practice of Interdisciplinarity in environmental science

Prof. Eduard Ariza

DAY 1, MONDAY 27 OF SEPTEMBER 2021 (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, TUESDAY 28 OF SEPTEMBER 2021 (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 29 OF SEPTEMBER 2021 (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, THURSDAY 30 OF SEPTEMBER 2021 (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.

PART 2: Introduction to ecological economics: debates and topics

Prof. Sergio Villamayor-Tomas

This block and Prof. Claudio Cattaneo's block constitute an introduction to Ecological Economics. Prof. Cattaneo's focuses on the foundations of Ecological Economics that have to do with biophysical analysis and connections to growth. This block covers the foundations that have to do with heterodox economics, pluralism and activism.

The two blocks will be introduced in the session of the 4th of October. Then, Prof. Cattaneo's and this block will follow.

In this block each of the sessions has two parts. In the first part we will discuss a transversal topic that is connected important to understand the tradition of ecological economics and the ecological economics work that we do at ICTA. In the second section we will know more about the work of specific groups at ICTA that

carry ecological economics-related work beyond social metabolism and environmental justice (covered in Claudio Cattaneo's block). These include climate economics (from a behavioral perspective), local ecological knowledge, and the commons.

4th of October.: Introduction to Ecological Economics and the Barcelona School

The goal of this session is twofold: 1) introduce the basic history and tenets of Ecological Economics and the particular take of scholars working at ICTA (recently referred to as the Barcelona School of Ecological Economics and Political Ecology); and 2) to have a firsthand introduction to the history of the Barcelona School by one of its founders.

Mandatory 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).

11th of October: Frontiers and paradigm changes in science: the case of Ecological Economics?

The goal of this session is twofold: 1) to become familiar with the process through which scientific standards and programs evolve, using the example of ecological economics; and 2) to have a firsthand introduction to the work on climate behavioral economics carried in one of the Ecological Economics research groups at ICTA.

Mandatory readings:

Walker, T. C. (2010). The perils of paradigm mentalities: Revisiting Kuhn, Lakatos, and Popper. *Perspectives on Politics*, 433-451.

Optional reading:

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.

13th of October: Scientific uncertainty: a problem?

The goal of this session is twofold: 1) Become familiar with the challenges and opportunities of doing research on complex environmental problems; and 2) to have a firsthand introduction to the work on local ecological knowledge carried in one of the Ecological Economics research groups at ICTA.

Mandatory reading:

Waltner Toews, D., Biggeri, A., & De Marchi, B. Post-normal Pandemics: Why COVID-19 Requires a New Approach to Science. STEPS Center, 25.03. 2020.

Optional Readings:

Reyes-García, V., García-del-Amo, D., Benyei, P., Fernández-Llamazares, Á., Gravani, K., Junqueira, A. B., ... & Soleymani-Fard, R. (2019). A collaborative approach to bring insights from local observations of climate change impacts into global climate change research. *Current opinion in environmental sustainability*, 39, 1-8.

28th of October: Transdisciplinary research and activism: what's your take?

The goal of this session is twofold: 1) 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; and 2) to have a firsthand introduction to the work on commons carried in one of the Ecological Economics research groups at ICTA.

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.

Optional Readings:

Villamayor-Tomas, S., & García-López, G. (2021). Commons Movements: old and new trends in the global South and North. *Annual Review of Environment and Resources*.

PART 3:

Prof. Claudio Cattaneo

This block of 4 sessions 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, extractivism and environmental conflicts (energy and materials) and a practical application to ecological urbanism is then introduced

Oct 5th: 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.

Reading:

Georgescu-Roegen, N., 1975. Energy and Economic Myths. *Southern Economic Journal*, 41(3).

<http://www.uvm.edu/~jfarley/EEseminar/readings/energy%20myths.pdf>

Oct 6th : Introduction to degrowth.

Reading:

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

Oct 7th: Climate Scenarios, commodity Frontiers, environmental conflicts and degrowth.

Readings:

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]

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

Oct 8th: From ecological economics to industrial (urban) ecology: Barcelona Doughnut Economics

Reading: [the City Portrait methodology](#)

Additional reading: Rueda, S. et al., *El Urbanismo Ecológico*. Agencia de Ecología Urbana de Barcelona. ([enlace a la teoría](#))

PART 4: Training stay in a natural space (14th, 15th and 16th oct)

Prof. Jordina Belmonte & Carles Barriocanal (jordina.belmonte@uab.cat; carlosalfredo.barriocanal@uab.cat)

The activities that we propose will take place in one of the natural spaces that the Fundació Catalunya-La Pedrera (FC-LP) owns and devotes to teaching and research activities. For more information

<http://fundaciocatalunya-lapedrera.com/en/nature>

UAB and FC-LP signed a contract in 2012 to facilitate the development of activities to UAB members, especially in Alinyà but not exclusively. 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 students participating get to know better each other and begin to collaborate and work together.

A detailed agenda on the travel to the space (that will be done by bus and organized by ICTA-UAB) 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 established later and will not exceed 100 €/person (for the 2,5 days that the training will last).

Aula activities, talks and debates related with the Knowledge and the sustainable use of the local environment. Main speakers: Jordina Belmonte (ICTA-UAB researcher & Dept. Animal Biology, Plant Biology and Ecology), Carles Barriocanal (Dept. Geography), personnel from the FC-LP to be determined and all master students in the debate.

- Introduction to the space visited: climatology, geomorphology, biodiversity, biogeography.
- Livestock and the management of pastures and forests
- Research projects
- Sustainable use of the local environment and practical interpretation of the landscape from a socioecological perspective.

Field activities:

- Adapted to the natural space visited.

SECOND SEMESTER

PART 5 : tools and methods of industrial ecology (2nd, 9rd, 16th i 23th february)

Prof. Laura Talens/ Carles Martínez Gasol

Block 1. Introduction to the circular economy, and the main tools of Industrial Ecology.

Introduction to Circular Economy:

- Introduction to the different schools of thought, with special emphasis on industrial ecology.
- Description of the various action plans in the Circular Economy in the EU.
- Linking the plans in Circular Economy with other EU strategies such as ecodesign regulations and critical materials.
- Understand the EU Ecodesign implementation process.
- Case study.

Introduction to Ecodesign

- Introduction to ecodesign
- Ecological design strategies
- Review of current ecodesign legislation.
 - Citizen science in the field of design and repair of electrical and electronic equipment. Case: restarters Barcelona.

Development of life cycle analysis (LCA)

- Introduction to LCA as a tool for evaluating products, services and projects.

- Environmental tools
- Case studies

Introduction to the carbon footprint applied to waste management.

- Introduction of the carbon footprint concept
- Use of the CO2ZW tool.

Perception and social conflict to selective waste collection systems as Door2Door that imply more proactivity by citizens. Case: Door to door in Sant Andreu a neighborhood of Barcelona.

Methodology

Block 1 (2ECT). Introduction to circular economy, and the main tools of industrial ecology

- 12 hours of class that include theory and practical exercises.
- 6 hours of Circular Economy, Ecodesign and theory applied to case studies
- 6 hours of stroke theory and theory applied to case studies
- 25 hours of readings (documents and case studies) and studies outside the classroom (individual and in groups)

Classroom hours: Theory classes will provide students with the necessary knowledge to understand the application of LCA and Ecodesign tools in the analysis and design of electrical and electronic equipment (EEE), as well as conceptualize a project proposal in circular economy.

Work outside the classroom: The project of designing a project in circular economy will be carried out outside the classroom to ensure that the students have understood the theoretical classes and to learn to put the concepts into practice.

Group projects: The conceptualization and design of a project proposal based on circular economy issues such as:

- Circular supply: use of recycled and reusable materials, instead of new materials.
- Recovery of resources through innovative processes that allow a positive impact on the value chain.
- Extend product life through recovery, resale, or eco-friendly innovation and design.
- Products as services: offering payment services for a product while maintaining its ownership for the subsequent recovery of resources.
- Innovation in processes through closed-loop production, to maximize the use of resources and minimize environmental impact.

The project proposal will be presented as follows:

- A short video describing your project (max. 7 min). The video should highlight the main objective, the potential benefits in environmental, social and economic terms and the tentative methodological approach to evaluate it.
- A brief report with the following content:
 - Section 1, general approach to the project:
 - o Description of the objective of the circular economy project.

- o Methodological approach
- o Possible benefits of the project.
- Section 2, evaluation of the potential impact project:
 - o Provisional environmental assessment of the project using tools that focus on a systematic and life cycle approach.
 - o Definition of the Functional Unit
 - o System and product description
 - o Discussion on the expected results of the evaluation using the selected environmental tool

The project proposals will be evaluated based on the following aspects:

- Speech and communication: clarity of the objective, the methodology and the results, and the correct use of vocabulary and terminology
- Time: adjusted use of time to important aspects
- Format and data: easy to understand and follow the discourse (good listening and reading of the information presented)
- Project: real applicability and replicability of the proposal, originality, and innovative nature of the idea. potential benefits on environmental, social and economic aspects. Existence of clear and measurable objectives and indicators of tracing.

PART 6: Communication and academic diffusion, also related to the Master's thesis (1stnd oct, 22th oct, 15th feb, 22th feb, 9th marCH and 15th marCH)

Antònia Casellas antonia.casellas@uab.cat

Course 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 Book Review: 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 have worked on in their fields of study.

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

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

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

PART 1: EDUARD ARIZA

Test (50% of the final grade) and an essay (50% of the final grade).

PART 2 AND 3: SERGIO VILLAMAYOR I CLAUDIO CATTANEO

For this block: in-class quizzes/short essays based on readings and or in-class activities (50%); essay based on readings and in-class content (50%).

PART 4: JORDINA BELMONTE/CARLES BARRIOCANAL

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 training; 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.

PART 5: CARLES M GASOL/LAURA TALENS

To pass the module, the student must have at least a grade of 4.0 in each block, the combined grade must be greater than 5. If the student fails in one module, he will have to re-register for the entire module.

Block 1: the evaluation will be of 30% of the initial tests done in class, 20% of the exercise of review of a publication of LCA as homework, 40% on the project as homework and 10% based on the participation and class attendance.

The degree of participation consists of:

1. Quizzes (Individual). Each class will begin with a 10-15-minute test based on the previous class and assigned readings. In addition to ensuring a continuous effort on the part of the students, this will also motivate them to arrive on time to class and be prepared to think. In "participation" both tests and small presentations have the same weight.
2. Homework (Individual). There will be 1 activity during the course based on a critical review of a LCA scientific publication.
3. Project (group). Students will make 1 video presentation of their project during the course. They will also submit a report on the conceptualization, design and method of assessing the potential environmental impact of the project. The final project and its presentation will be announced during the classes.

PART 6: ANTÒNIA CASELLAS

Book review 50%

Essay - Introduction 30%

Class Presentations..... 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

PART 1: EDUARD ARIZA

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

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.

PART 2: SERGIO VILLAMAYOR

Readings in the content section.

PART 3: CLAUDIO CATTANEO

Readings in the content section.

PART 4: JORDINA BELMONTE/CARLES BARRIOCANAL

Will be proposed later, when having decide don the natural space that will be visited.

PART 5: CARLES M GASOL/LAURA TALENS

Guinée, Jeroen (Ed.). 2002. *Handbook on Life Cycle Assessment. Operational Guide to the ISO Standards*. Springer. ISBN 978-0-306-48055-3.

·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 Seigné-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

·Kirchherr, J. Et al 2017. Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*. 2017. <https://doi.org/10.1016/j.resconrec.2017.09.005>

EU Action Plan for Circular Economy:

http://ec.europa.eu/environment/circular-economy/implementation_report.pdf

Ellen MacArthur definition of Circular Economy:

<https://www.ellenmacarthurfoundation.org/circular-economy/overview/concept>

Chancere, P., Rotter, S., 2009. Recycling-oriented characterization of small waste electrical and electronic equipment. *Waste Manag.* 29, 2336-2352. <https://doi.org/10.1016/j.wasman.2009.04.003>

Ecodesign directive: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0125>

Gabarrell i Durany X, Sanjuan Delmás D, Martinez Gasol C, Feced Mateu M, Talens Peiró L and J Rieradevall Pons. 'Implementation of the Ecodesign Directive via working plans, based on the analysis of the selected product groups'. ISBN 978-92-846-2225-2. European Union, 2017. Available at: [http://www.europarl.europa.eu/RegData/etudes/STUD/2017/611015/EPRS_STU\(2017\)611015_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/611015/EPRS_STU(2017)611015_EN.pdf)

Ueberschaar, M., Otto, S.J., Rotter, V.S., 2017. Challenges for critical raw material recovery from WEEE -The case study of gallium. *Waste Manag.* 60, 534-545. <https://doi.org/10.1016/j.wasman.2016.12.035>

Talens Peiró L., Castro Girón A., Gabarrell i Durany X. Examining the feasibility of the urban mining of hard disk drives. *Journal of Cleaner Production*. 2019. <https://doi.org/10.1016/j.jclepro.2019.119216>.

Talens Peiró L., Polverini D., Ardente F., Mathieux F. 2019. Advances towards circular economy policies in the EU: The new Ecodesign regulation of enterprise servers. *Resources, Conservation and Recycling*. 2019. <https://doi.org/10.1016/j.resconrec.2019.104426>.

Blengini G.A.; et al. 2017. EU Methodology for Critical Raw Materials Assessment: Policy Needs and Proposed Solutions for Incremental Improvements. *Resources Policy*. 53, pp.12-12

PART 6: ANTÒNIA CASELLAS

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

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

Evans, David, Gruba, Paul & Zobel, Justin (2014) *How to write a better thesis*. Third Edition. Cham: Springer.

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

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

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

Locke, Laurence, Spirduso, Warren Wyrick, & Silverman, Stephan. J.(2014) *Proposals that work : a guide for planning dissertations and grant proposals*.Sixth edition. Thousand Oaks, California: Sage.

Meloy, Judith M. (2002).*Writing the qualitative dissertation: understanding by doing*.2nd ed. Mahwah, N.J.: Lawrence Erlbaum Associates.

Silva, Paul J.(2007) *How to Write a Lot: A Practical Guide to Productive Academic Writing*.

Washington, DC: American Psychological Association.

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

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

Warren, Carol & Karner, Tracy (2015). *Discovering qualitative methods: ethnography, interviews, documents, and images*. New York : Oxford University Press.

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

Software

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