Universitat Autònoma de Barcelona

2023/2024

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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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Teachers

Jordina Belmonte Soler

Laura Talens Peiro

Ricard Moren Alegret

Jesus Ramos Martin

Jorge Cristobal Rosello

Sergio Villamayor Tomas

Carles Gasol Martinez

Prerequisites

No prerequisites

Objectives and Contextualisation

This is a 15 ECTS introductory and compulsory module which is shared by all the Master's specialisations.

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. In this vein, this module aims to ensure that all Master's students are familiar with interdisciplinarity of environmental studies, offering at the same time some basics concepts and tools of all Master's specialisations.

From this interdisciplinary approach, 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. The participation of several teachers with diverse backgrounds and research experience enriches the module, as different and complementary perspectives will be discussed.

The module is divided in 5 parts:

- Part 1: Theory and Practice of interdisciplinarity in environmental science.
- Part 2: Introduction to ecological economics.
- Part 3: Introduction to Industrial Ecology.
- Part 4: Introduction to Global Change (a training stay in a natural space).
- Part 5: Communication and academic dissemination.

Parts 1 and 5 are broadly focused on interdisciplinarity either from a theoretical (part 1) or writing methods perspectives (part 5). In-between, parts 2 to 4 offer a basic introduction to each one of the Master's itineraries - Ecological Economics (part 2), Industrial Ecology (part 3) and Global Change (part 4) - without missing the module's interdisciplinary approach.

As this is an introductory module, most of the lectures take place during the first weeks of the Master, including a fieldtrip to the Planes de Son (Pyrenees). Nevertheless, the practical part of part 5 is carried out in February. As this is a practical part, students will be organised in two sub-groups. In this part basic issues related to communication and scientific dissemination will be practiced, developing some very useful skills for developing the Final Master's Thesis (TFM).

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

Module coordinator: Marc Parés
Course presentation: 26th of September-> 10h-13h

PART 1 - THEORY AND PRACTICE OF INTERDISCIPLINARITY IN ENVIRONMENTAL SCIENCE

Professor: Marc Parés

Dates: 26th, 27th, 28th, 29th of September -> 15h-18h.

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 wicked problems
- Epistemological pluralism

Weak vs Strong transdisciplinarity

- Multi, inter and transdiciplinarity.
- Weak transdisciplinarity (Max-Neef questions)
- Strong transdisciplinarity (levels of reality, overcoming dualism and complexity)

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?

Whole Systems Thinking

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

PART 2 - INTRODUCTION TO ECOLOGICAL ECONOMICS

Professors: Sergio Villamayor (block A) & Jesús Ramos (block B)

Block A dates: 2nd, 3rd, 4th and 5th of October -> 15h-18h.

Block B dates: 6th, 9th, 10th and 11th of October -> 15h-18h.

This part of the module constitutes an introduction to Ecological Economics and will be divided in two blocks:

- Block A: the foundations that have to do with heterodox economics, pluralism, and activism.
- Block B: the foundations of Ecological Economics that have to do with biophysical analysis and connections to growth/degrowth/postgrowth. This block 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 look to ecological unequal exchange.

The sessions will be distributed as follows:

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 first hand introduction to the history of the Barcelona School by one of its founders.

Mandatory reading for this session:

- 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).

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 first hand introduction to the work on climate behavioral economics carried in one of the Ecological Economics research groups at ICTA.

Mandatory readings for this session:

- Walker, T. C. (2010). The perils of paradigm mentalities: Revisiting Kuhn, Lakatos, and Popper. *Perspectives on Politics*, 433-451.
- Villamayor-Tomas, S., Roy, B., Muradian, R., (2022). "The Barcelona School of ecological economics and political ecology: Building bridges between moving shores", in Villamayor-Tomas, S. and R. Muradian (eds.), *The Barcelona school of ecological economics and political ecology, Springer: A Companion in Honour of Joan Martinez-Alier,* Springer.

Plurality of values and knowledge

The goal of this session is to have a first hand introduction to the work on evolutionary economics and environmental psychology, and local ecological knowledge carried out by two of the Ecological Economics research groups at ICTA.

Mandatory reading for this session:

- 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.

Institutions, justice and research activism

The goal of this session is twofold: 1) to have a first hand introduction to the work on institutional analysis and environmental justice carried out by two of the Ecological Economics research groups at ICTA; and 2) 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.

Mandatory reading for this session:

- 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 reading for this session:

- Villamayor-Tomas, S., & García-López, G. (2018). Social movements as key actors in governing the commons: Evidence from community-based resource management cases across the world. *Global environmental change*, *53*, 114-126.

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.

Mandatory reading for this session:

- Georgescu-Roegen, N., 1975. Energy and Economic Myths. *Southern Economic Journal*, 41(3). https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_proquest_miscellaneous_59656243

Introduction to degrowth.

Mandatory reading for this session:

- Kallis, G., et al., 2018. Research on Degrowth, *Annual Review of Environment and Resources*, 43, 4.1-4.26 https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_gale_infotracmisc_A562581989

Climate Scenarios, commodity Frontiers, environmental conflicts and degrowth.

Mandatory readings for this session:

- Koch, M. (2015): Climate Change, Capitalism and Degrowth Trajectories to a Global Steady-State Economy. *International Critical Thought*, Vol. 5 (4): 439-452. http://dx.doi.org/10.1080/21598282.2015.1102078
- Anderson, K., and Peters,G., (2016). The trouble with negative emissions. Science, Vol. 354 (6309), 182-183. https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_swepub_primary_oai_DiVA_org_uu_311
- Conde, M., and Walter, M., (2015) Commodity Frontiers (Ch 13), in D'Alisa, Demaria, F., & Kallis, G. (Eds.). *Degrowth: A Vocabulary for a New Era*. Routledge. Pp: 71-75. https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_informaworld_taylorfrancisbooks_10_432

Trade and the environment. EcologicalUnequal Exchange.

Mandatory readings for this session:

- Muradian, R., and Martínez-Alier, J. (2001): Trade and the environment: from a 'Southern' perspective. Ecological Economics, Vol. 36(2): 281-297. https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_proquest_miscellaneous_57016233
- Hickel, J., Dorninger, C., Wieland, H., Suwandi, I. (2022): Imperialist appropriation in the world economy: Drain from the global South through unequal exchange, 1990-2015. Global Environmental Change, Vol. 73: 102467. https://bibcercador.uab.cat/permalink/34CSUC_UAB/1eqfv2p/alma991010564893106709

PART 3 - INTRODUCTION TO INDUSTRIAL ECOLOGY

Professors: Laura Talens & Carles Gasol

Dates: 13th, 16h, 17th and 18th of October -> *15h-18h.*

This part of the module offers an introduction to the circular economy and reviews the main tools of Industrial Ecology.

Sessions will be distributed as follows:

Introduction to Circular Economy

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

Introduction to Ecodesign

- Introduction to ecodesign and their application to products
- Review of EU environmental product legislation (EU Ecodesign regulation and Sustainable Product Policy)
- Discussion on existing implementing measures

Overview on LCA tools

- Introduction to LCA as a tool for evaluating products, services and projects.
- Introduction to Carbonfootprint oforganizations, products and services.
- Environmental qualitative tools: Strategic Environmental Valuation.
- Environmental certification systems for products and organisations.

Introduction to the carbon footprint applied to waste management

- Introduction to municipal waste management systems and their relationship with carbon footprint and impact savings.
- Use of the CO2ZW tool.

PART 4 - INTRODUCTION TO GLOBAL CHANGE

Professors: Jordina Belmonte & Jordi Cristóbal

*Dates: 19*th, 20th, 21st of October -> fieldtrip to Planes de Son.

This part of the program will take place out of UAB and far from its campus (250 Km) and will last 2,5 days. The experience will offer 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.

The activities 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, MónNatura Pirineus. For more information visit: https://fundaciocatalunya-lapedrera.com/en/nature-spaces/monnatura-pirineus

Why in this area? UAB and FC-LP signed a contract in 2012 to facilitate the development of teaching and research activities to UAB members, especially in Alinyà but not exclusively and due to the size of our group, our activities are developed in MónNatura Pirineus.

As an example of the activities and debates:

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

* FC-LP (the Catalunya La Pedrera Foundation) is a private and independent foundation, led by a board of trustees comprising experts in the different fields it works in. It strives to improve people's quality of life and build a better future (https://www.fundaciocatalunya-lapedrera.com/en/who-we-are)

PART 5 - COMMUNICATION AND ACADEMIC DISSEMINATION

Professor: Ricard Morén-Alegret.

Dates & distribution of group/sub-groups:

Full group: 3rd and 17th of November -> 15h-18h.

Sub-group A (surname from A to L): 13th, 20th, 27th of February and 7th of March -> 10h-13h.

Sub-group B (surname from M to Z): 13th, 20th, 27th of February and 7th of March -> 15h-18h.

The goal of this parts is to introduce students to some fundamentals of writing and offering presentations in the context of academic work. The main objective is to help students to dominate several specific requirements of writing academic articles, reports, and theses, as well as of preparing presentations at the graduate level. With this objective, students will specifically work on the design oftheresearch, the critical summary, the synthesis, and the presentations.

Topics covered in class include discussion of academic writing, article structure, abstracts, introductions/conclusions, literature reviews, evidence provision, referencing styles, sources and citations, plagiarism, scholarly sources, and library resources. Students will also address strategies for presenting academic information. The course offers opportunities for discussions and exercises in the classroom or outdoors, which are mandatory.

Sessions of part 5 include:

1) Readings: students will read academic articles selected by the lecturer and the students themselves. The readings will be discussed in class.

2) Short Writing: Throughout the classes, students will complete various short writing exercises in class. These will be exercises in the use of concepts learned in class/reading and will be incorporated into an individual final PowerPoint presentation, including a compilation of exercises and additional inputs.

3) Academic debates: collective discussions will take place in the classroom and outdoors

4) Exams (27 February 2024): students will participate in two individual written exams:

Exam 1: basic definitions in academic writing, article structure, abstracts, introductions/conclusions, literature reviews, evidence provision, referencing styles, sources and citations, plagiarism, scholarly sources, and library resources.

Exam 2: problem-solving exam, focusing mainly on strategies for presenting academic information.

5) Oral presentation with support of PowerPoint (7 March 2024): during the last class students will individually present in the classroom their academic work along the course displaying a PowerPoint prepared under the instructions of the lecturer and will receive comments from the class.

Mandatory readings for part 5:

- Boncori, Ilaria (2023) Researching and Writing Differently. Bristol, UK: Policy Press. See: https://bibcercador.uab.cat/permalink/34CSUC_UAB/1eqfv2p/alma991010817743806709
- Eco, Umberto (2015) *How to Write a Thesis*, Cambridge, Massachusetts, USA:MIT Press. See: https://bibcercador.uab.cat/permalink/34CSUC_UAB/avjcib/alma991010481837706709
- Freiermuth, Mark R. (2023) *Academic Conference Presentations: A Step-By-Step Guide*, London: Springer. See: https://bibcercador.uab.cat/permalink/34CSUC_UAB/1c3utr0/cdi_proquest_ebookcentral_EBC7168715
- Hsu, Hua (2015) A Guide to Thesis Writing that is a Guide to Life, *The New Yorker*, April 6, see: https://www.newyorker.com/books/page-turner/a-guide-to-thesis-writing-that-is-a-guide-to-life
- Morén-Alegret, Ricard; Milazzo, Josepha; Romagosa, Francesc & Kallis, Giorgos (2021) 'Cosmovillagers' as Sustainable Rural Development Actors in Mountain Hamlets? *European Countryside Journal*, 13(2), 267-296. See: https://doi.org/10.2478/euco-2021-0018

- Pullen, Alison; Helin, Jenny & Harding, Nancy (2020) *Writing Differently*, Bingley, UK: Emerald Publishing Limited. See: https://bibcercador.uab.cat/permalink/34CSUC_UAB/1eqfv2p/alma991010496454506709

Methodology

PART 1 - THEORY AND PRACTICE OF INTERDISCIPLINARITY IN ENVIRONMENTAL SCIENCE
Students will have to read, summarize and prepare a short presentation of an assigned reading per each session of this part. Each session will start with a brief introduction to the specific topic given by the instructor. Then, a jigsaw puzzle methodology will be used to present and discuss the assigned readings, followed by a group debate of the main points discussed in the readings. Finally, students will answer individually a questionaire related with the discussed issues.
PART 2 - INTRODUCTION TO ECOLOGICAL ECONOMICS
Sessions will be based on lectures and reading discussion at class. Students will have to write two essays, one per each block of this part.
PART 3 - INTRODUCTION TO INDUSTRIAL ECOLOGY
Classroom hours: Theory classes will provide students with the necessary knowledge to understand the application of LCA, Carbon Footprint 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 consist of two exercises: a paper review focused on a case study on LCA and one group research project.

The project on circular economy will be carried out outside the classroom to ensure that the students have understood the theoretical classes and have 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:

- Description of the objective of the circular economy project.
- Methodological approach
- Possible benefits of the project

Section 2, evaluation of the potential impact of the project:

- Provisional environmental assessment of the project using tools that focus on a systematic and life cycle approach.
- Description of the Functional Unit, and the system or product description
- 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 4 - INTRODUCTION TO GLOBAL CHANGE

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. Although the master will run with most of the expenses, the students will be asked to contribute a little to the travel and the stay. The amount required will be stablished later and will not exceed 100 €/person (for the 2,5 days that the training will last).

We will do outdoor activities as well as aula activities, talks and debates related with the Knowledge and the sustainable use of the local environment. Main speakers: Jordina Belmonte (ICTA-UAB researcher & professor at the Dept. of Animal Biology, Plant Biology and Ecology-UAB), Jordi Cristobal (IRTA researcher & associate professors at the Dept. of Geography-UAB), personnel from the FC-LP to be determined and all master students in the debates.

Field activities will be carried out adapted to the natural space visited and the meteorology.

PART 5 - COMMUNICATION AND ACADEMIC DISSEMINATION

- Lectures, problem solving and case studies
- Learning based on real cases
- Written presentation using PowerPoint and oral presentation in the classroom of academic work
- Scientific debates and discussions
- Participation in complementary activities

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			
Lectures	40	1.6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Practical exercices	15	0.6	2, 3, 6, 10, 11
Seminars	40	1.6	2, 3, 4, 11
Type: Supervised			
Course works	35	1.4	1, 3, 10, 11
Reading papers	40	1.6	10, 11

Tutorships	7	0.28	1, 3, 4, 5, 6, 7, 8, 9, 11
Type: Autonomous			
Exercice preparation	45	1.8	1, 2, 4, 10, 11
Information research	50	2	10, 11
Personal study	50	2	1, 3, 4, 5, 6, 7, 8, 9, 10, 11
Readings	50	2	1, 3, 4, 5, 6, 7, 8, 9, 10, 11

Assessment

Grades will be distributed as follows:

- Part 1: 15%
- Part 2: 30%
- Part 3: 15%
- Part 4: 20%
- Part 5: 20%

Each part must be passed (5 out of 10) in order to pass the module.

Single Assessment: This module does not offer the Single Assessment modality, in accordance with the coordination of the degree and with the Dean's Office of the Faculty of Sciences.

Plagiarism: Copying or plagiarism in any type of assessment activity constitutes a crime, and will be penalized with a 0 as a grade, losing the possibility of recovering it, whether it is an assignment individual or group (in this case, all members of the group will have a 0). If during the realization of individual work in class, the lecturer detects that a student is trying to copy or to use some type of document or device not authorized by the faculty, the same will be graded with a 0, without recovery option. It will be considered that a work, activity or exam is "copied" when it reproduces all or a significant part of another partner one's work. It will be considered that a work or activity is "plagiarized" when it is presented as an own a part of an author's text, without citing the sources, regardless of the original sources whether on paper or in digital format.

PART 1 - THEORY AND PRACTICE OF INTERDISCIPLINARITY IN ENVIRONMENTAL SCIENCE

- Class participation: 10%
- Reading questions at class: 40%
- Essay (per groups): 50%

PART 2 - INTRODUCTION TO ECOLOGICAL ECONOMICS

- Block A: 1.500 words essay on the Barcelona School of Ecological Economics and Political Ecology: 50%
- Block B: 1.500 words essay on "the global impact of my living standard" based on readings and in-class content: 50%

PART 3 - INTRODUCTION TO INDUSTRIAL ECOLOGY

The following assessment activities will be carried out:

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.

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.

Grades will be distributed as following:

- Initial tests done in class: 30%
- Exercise of review of a publication of LCA as homework: 20%
- Project as homework: 40%
- Participation and class attendance: 10%

PART 4 - INTRODUCTION TO GLOBAL CHANGE

Students will follow an evaluation consisting in the elaboration (groups of 4-5) of a poster dealing with the learnings and experiences of the fieldtrip that they will defend at the end of the stay. They will be evaluated from 0 to 10.

PART 5 - COMMUNICATION AND ACADEMIC DISSEMINATION

- Proactive, critical, and constructive participation in the discussions of the readings: 20%
- Class exercises: 25%
- Exams: 35%
- Oral presentation with PowerPoint support: 20%

IMPORTANT NOTE: To pass part 5 of the module, the established days it is necessary to present the exercises in the classroom, do the exams on site (earning at least a mark of 5 out of 10), and make the oral presentation with PowerPoint support in the classroom. Participation, class exercices and oral presentation cannot be re-assessed.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assignments, projects and course works	30	0	0	2, 3, 4, 5, 7, 8, 10, 11
Attendance and active participation at class	10	0	0	1, 2, 4, 5, 6, 8, 9, 11
Essays	20	0	0	2, 11
Exams	7	3	0.12	2, 10
Fieldtrip activities	20	0	0	2, 3, 5, 6, 7, 8, 9, 10, 11
Quizzes and questionaires at class	13	0	0	3, 4, 5, 7, 11

Bibliography

PART 1 - THEORY AND PRACTICE OF INTERDISCIPLINARITY IN ENVIRONMENTAL SCIENCE

- Farrell, K., Luzzati, T., and S. van den Hove. 2013. What lies beyond reductionism? Taking stock ofinterdisciplinary research in ecological economics. In: Farrell, K., Luzzati, T. and S. van den Hove (eds).Beyond Reductionism: A passion for interdisiplinarity. 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 - INTRODUCTION TO ECOLOGICAL ECONOMICS

- 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).
- Walker, T. C. (2010). The perils of paradigm mentalities: Revisiting Kuhn, Lakatos, and Popper. *Perspectives on Politics*, 433-451.
- Villamayor-Tomas, S., Roy, B., Muradian, R., (2022). "The Barcelona School of ecological economics and political ecology: Building bridges between moving shores", in Villamayor-Tomas, S. and R. Muradian (eds.), *The Barcelona school of ecological economics and political ecology, Springer: A Companion in Honour of Joan Martinez-Alier,* Springer.
- 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.
- 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.
- Villamayor-Tomas, S., & García-López, G. (2018). Social movements as key actors in governing the commons: Evidence from community-based resource management cases across the world. *Global environmental change*, *53*, 114-126.
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Software

Explained in the content section of each part