

Degree	Type	Year
2501915 Environmental Sciences	OT	4

Contact

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

There are none.

Objectives and Contextualisation

The objective of the subject is twofold: on the one hand, to understand the basic concepts of ecological economics that should allow us, on the other, to understand human systems as systems open to the input of energy and materials, and to the output of waste. That is, the biophysical functioning of economies is studied, what is known as "societal metabolism" and the role that natural resources play in maintaining the economic system.

The course also studies sustainable development and its evolution over time, with concepts such as eco-efficiency and the circular economy. The laws of thermodynamics and their importance in economics will be discussed, as well as complexity, systems theory and hierarchy theory, and their applications to economic systems. The exosomatic evolution of societies, the circular economy and degrowth will be discussed.

At the end of the course the student will have a clearer idea of:

- i) The basic concepts of ecological economics and its use in environmental sciences;
- ii) The basic literature of the methods and concepts presented;
- iii) The relationship between the economic process of human systems and the earth system, as well as the different approaches used to analyze this interaction

Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Demonstrate adequate knowledge and use the tools and concepts of the most relevant social science environment.

- Demonstrate concern for quality and praxis.
- Demonstrate initiative and adapt to new situations and problems.
- Teaming developing personal values regarding social skills and teamwork.
- Work autonomously

Learning Outcomes

1. Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
2. Analyze and use information critically.
3. Critically analyze basic environmental science literature in Catalan, Castilian and English.
4. Demonstrate concern for quality and praxis.
5. Demonstrate initiative and adapt to new situations and problems.
6. Identify environmental and social impacts associated with human activity.
7. Properly use the analytical concepts of environmental science.
8. Teaming developing personal values regarding social skills and teamwork.
9. Work autonomously

Content

1. The economy as an open subsystem within the biosphere
 - a. The environment in the economy
 - b. Environmental economics and ecological economics
 - c. Main magnitudes and economic aggregates
 - d. The income cycle and the generation of added value
 - e. Natural resources in the economic process

Basic Reading: [Martínez Alier y Roca Págs. 14-26, 90-127, 448-466, 572-574](#); [Pérez-Rincón 2024](#); [Common and Stagl 2005: 1-6](#).

Complementary Reading: [Ramos-Martin 2004](#); [Martínez-Alier 2023](#).

2. Sustainable development and its evolution, eco-efficiency, green economy and circular economy
 - a. From ecodevelopment to sustainable development
 - b. The Brundtland Commission and Sustainable Development
 - c. Eco-efficiency and dematerialization
 - d. Green economy and circular economy
 - e. The UN journey to the Sustainable Development Goals

Basic Reading: [Common and Stagl 2005: 362-379](#); [Puig Ventosa and Martínez Sánchez 2023](#); [Harris 2023](#).

Complementary Reading: [Gómez-Baggethun 2012](#); [Villarraga 2023](#).

3. Complexity, hierarchies and evolution
 - a. Complexity and its relationship with energy
 - b. The laws of thermodynamics and their economic interpretation
 - c. The economic myths of Georgescu-Roegen and the bioeconomic paradigm

Basic Reading: [Ramos-Martin 2004](#); [Lomas 2023](#)..

Complementary Reading: [Common and Stagl 2005: 26-36](#)

4. Exosomatic evolution of societies
 - a. Endosomatic and exosomatic energy
 - b. The Podolinsky economic coefficient
 - c. Lotka, Odum and Ulanowicz
 - d. Exosomatic evolution of societies (Peak oil)

Basic Reading: [Martínez Alier y Roca Págs. 26-47, 370-378, 498-505, 582-587](#); [Valero et al., 2021](#).

Complementary Reading: [Kerschner et al., 2010](#).

5. The scale of the economy and the debate on degrowth
 - a. From scarcity problems to sink problems
 - b. The limits to growth
 - c. Daly's Steady State
 - d. Debates about degrowth and post-growth

Basic Reading: [Martínez Alier y Roca Págs. 466-498, 574-577](#); [Sempere 2008](#). [Carpintero y Nieto 2021](#).

Complementary Reading: [Daly 1995](#); [Kallis 2023](#); [O'Neill 2012](#).

6. Ownership and access to natural resources
 - a. Typology of property rights and its relationship with the management of natural resources
 - b. Governance of the commons: theory and examples. Hardin's Tragedy of the Commons
 - c. Processes of access and exclusion to natural resources
 - d. Examples: global commons (sea and atmosphere), biopiracy, land-grabbing

Basic Reading: [Martínez Alier y Roca Págs. 419-423](#); [Aguilera 1992](#).

Complementary Reading: [GRAIN 2014](#), [D'Alisa 2013](#).

7. Political ecology: ecological-distributive conflicts and environmental justice
 - a. Ecological-distributive conflicts
 - b. Environmental justice movements
 - c. The example of Ecological Debt and Carbon Debt
 - d. Political Ecology

Basic Reading: [Martínez Alier y Roca Págs. 522-528, 532-558, 593-594](#). [Martínez-Alier 2004](#).

Complementary Reading: [Guha 1995](#); [Scheidel 2023](#).

8. Post-normal science and multi-criteria analysis for decision making
 - a. Methodological foundations (substantive and procedural rationality, complexity and post-normal science).
 - b. Structuring of a multi-criteria problem (alternatives and criteria, weighting of the criteria).
 - c. Main discrete multicriteria approaches (Utility Approach, MAUT; Outranking Methods; NAIADE).
 - d. Examples

Basic Reading: [Munda 2004](#); [Funtowicz and Ravetz 2023](#).

Complementary Reading: [Falconí y Burbano 2004](#); [Martí et al., 2000](#); [Comas et al., 2012](#).

9. Trade and environment
 - a. Determinants of trade: absolute and relative advantages
 - b. International trade governance (WTO)
 - c. Environmental implications of international trade
 - d. Unequal exchange, unequal ecological exchange and unequal caloric exchange

Basic Reading: [Martínez Alier y Roca Págs. 81-85, 506-522, 528-532](#); [Samaniego et al. 2015](#); [Pérez-Rincón 2007](#).

Complementary Reading: [Falconí et al., 2017](#); [Ramos-Martin et al., 2017](#); [UNCTAD 2022](#); [Pérez 2006](#); [Espinoza et al., 2016](#); [Peinado 2018](#).

10. Biodiversity economics and governance

- a. The timeline of biodiversity governance: from the Convention on Biological Diversity (1992) to the Nagoya Protocol (2010)
- b. The generation of value from biodiversity (appropriation mechanisms)
- c. Nagoya Protocol and the multilateral system of access to genetic resources
- d. The fair and equitable distribution derived from access to genetic resources: monetary and non-monetary benefits

Basic Reading: [Martínez Alier y Roca Págs. 558-571](#); [Nijar 2011](#); [Common and Stagl 2005: 521-527, 534-537](#).

Complementary Reading: [Vogel 2004](#), [Reyes 1996](#).

11. Economics and governance of climate change

- a. Greenhouse effect and global warming
- b. Climate change governance (UNFCCC and IPCC)
- c. Kyoto Protocol, Paris Agreement, national communications and NDC
- d. Compliance mechanisms: emissions markets, clean development mechanism, joint implementation.

Basic Reading: [Martínez Alier y Roca Págs. 81-85, 540-558](#); [Ramos-Martin 2001](#); [Common and Stagl 2005: 482-517](#).

Complementary Reading: [Falconí et al., 2019](#); [Fernández-Reyes 2016](#); [CEPAL 2015](#).

12. Analysis of the metabolism of societies

- a. Input-Output Analysis
- b. Material Flow Analysis
- c. Energy analysis, energy accounting, eMergy, exergy
- d. Multiscalar Analysis of the Metabolism of Societies and Ecosystems (MuSIASEM)

Basic Reading: [Martínez Alier y Roca Págs. 47-89](#); [Eisenmenger et al., 2007](#); [Ramos-Martin 2012](#).

Complementary Reading: [Vallejo 2006](#); [Moncada 2006](#); [Pérez 2006](#); [Muñoz y Roca 2006](#); [Madrid y Velázquez 2008](#); [Velasco-Fernández et al. 2015](#); [Toledo 2008](#); [Guzmán y González de Molina 2008](#); [Tello et al., 2008](#); [González et al., 2015](#); [Giampietro 2023](#).

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Seminars	8	0.32	1, 2, 3, 4, 5, 6, 7, 8, 9
Theory	40	1.6	2, 3, 5, 6, 7, 9
Type: Supervised			

Tutoring	17	0.68	1, 2, 4, 5, 9
Type: Autonomous			
Information research	10	0.4	2, 3, 9
Personal study	61	2.44	2, 3, 4, 5, 6, 7, 9

Classes will focus on exposing the conceptual bases and foundations of ecological economics, as well as discussing its applicability in the current context. Current phenomena regarding the use of energy and materials at a national and global level will be analyzed, as well as the impacts on both nature and distributive justice.

For each class, students must have read the mandatory bibliography for each session and will raise any doubts they have with the teacher.

The multidisciplinary approach of ecological economics requires from the student a strong degree of autonomous work that must consist of recommended readings, in addition to the mandatory ones, and in the discussion, with the teacher and in the classroom, of the concepts and analytical methods learned.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1st partial Exam	35%	2	0.08	1, 2, 3, 4, 5, 6, 7, 9
2nd partial Exam	35%	2	0.08	1, 2, 3, 4, 5, 6, 7, 9
Written assignment	30%	10	0.4	1, 2, 3, 4, 5, 6, 7, 8, 9

CONTINUOUS EVALUATION

The continuous evaluation of the subject will consist of:

- 2 partial knowledge exams that may combine multiple choice and thematic questions and that will count for 35% of the final grade each.
- A written assignment, which will count 30% of the final grade.

SINGLE EVALUATION

Students who take the Single Evaluation for this subject must take a single exam on the day indicated in the calendar, and will also hand in their individual work that day. The final grade will be calculated following the following weighting: 70% of the exam, and 30% of the written assignment.

RETAKE

If the student fails the subject, whether it is the continuous evaluation or the single evaluation, they have another opportunity to pass the subject through the retake exam that will be held on the date set by the coordination of the degree. In this test, 70% of the grade can be recovered, corresponding to theory and seminars. Written assignments will not be recoverable. If a minimum grade of 3 is exceeded, this grade will be averaged with the grade obtained in the written assignment, taking into account the weighting of 70% for the exam and 30% for the written assignment.

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Software

No need for specific software.

Language list

Name	Group	Language	Semester	Turn
(SEM) Seminars	1	Spanish	first semester	morning-mixed
(TE) Theory	1	Spanish	first semester	morning-mixed