Ecological Economics

Code: 106783
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Sciences	OP	4

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

None established.

Objectives and Contextualisation

The objective of the course is twofold: first, to understand the basic concepts of ecological economics that enable us to view human systems as open systems, receiving energy and materials as inputs and producing waste as outputs. In other words, the course examines the biophysical functioning of economies, known as "social metabolism," and the role that natural resources play in sustaining 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 significance in economics will be discussed, along with the concepts of 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 understanding of:
i) The basic concepts of ecological economics and their use in environmental sciences;
ii) The basic literature on 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 for the analysis of this interaction

Learning Outcomes

1. CM42 (Competence) Analyse the ethical implications or implications related to diversity and democratic values involved in the different strategies of territorial management and/or environmental conflict resolution.
2. CM43 (Competence) Analyse the inequalities based on sex/gender that different political and/or economic models of environmental management can generate.
3. KM55 (Knowledge) Identify, in relation to the flows of energy and matter operating on a global scale, the main distributive ecological conflicts and the relationship between the economy and trade, biodiversity and climate change.

4. KM56 (Knowledge) Recognise advanced tools for the management of environmental problems such as the sustainable development objectives, the circular economy, degrowth and environmental negotiation.
5. SM53 (Skill) Incorporate the different types of economic and social knowledge that characterise environmental issues.
6. SM54 (Skill) Critically analyse the different political and economic models of environmental management.

Content

1. The economy as an open subsystem within the biosphere

1. The environment in the economy
2. Environmental economics and ecological economics
3. Main economic magnitudes and aggregates
4. The income cycle and the generation of added value
5. 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 Readings: Ramos-Martin 2004; Martínez-Alier 2023.

2. Sustainable development and its evolution, eco-efficiency, green economy, and circular economy

1. From eco-development to sustainable development
2. The Brundtland Commission and Sustainable Development
3. Eco-efficiency and dematerialization
4. Green economy and circular economy
5. The UN's journey toward the Sustainable Development Goals

Basic Reading: Common and Stagl 2005: 362-379***;*** Puig Ventosa and Martínez Sánchez 2023***;*** Harris 2023***.***

Complementary Readings: Gómez-Baggethun 2012*;* Villarraga 2023*.*

3. Complexity, Hierarchies, and Evolution

1. Complexity and its Relationship with Energy
2. The Laws of Thermodynamics and Their Economic Interpretation
3. Georgescu-Roegen's Economic Myths and the Bioeconomic Paradigm

Basic Reading: Ramos-Martin 2004***;*** Lomas 2023***.***.

Complementary Readings: Common and Stagl 2005: 26-36

4. Exosomatic Evolution of Societies

1. Endosomatic and Exosomatic Energy
2. Podolinsky's Economic Coefficient
3. Lotka, Odum, and Ulanowicz
4. 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 Readings: Kerschner et al., 2010.

5. The Scale of the Economy and the Degrowth Debate

1. From Scarcity Problems to Sink Problems
2. The Limits to Growth
3. Daly's Steady State
4. Debates on Degrowth and Postgrowth

Basic Reading: Martínez Alier y Roca Págs. 466-498, 574-577***;*** Sempere 2008***.*** Carpintero y Nieto 2021***.***

Complementary Readings: Daly 1995*;* Kallis 2023*;* O'Neill 2012*.*

6. Property and Access to Natural Resources

1. Typology of Property Rights and Their Relationship to Natural Resource Management
2. Governance of the Commons: Theory and Examples. Hardin's The Tragedy of the Commons
3. Processes of Access to and Exclusion from Natural Resources
4. Examples: Global Commons (Sea and Atmosphere), Biopiracy, Land Grabbing

Basic Reading: Martínez Alier y Roca Págs. 419-423; Aguilera 1992.

Complementary Readings: GRAIN 2014, D'Alisa 2013.

7. Political Ecology: Ecological-Distributive Conflicts and Environmental Justice

1. Ecological-Distributive Conflicts
2. Environmental Justice Movements
3. The Example of Ecological Debt and Carbon Debt
4. Political Ecology

Basic Reading: Martínez Alier y Roca Págs. 522-528, 532-558, 593-594***.*** Martínez-Alier 2004***.***

Complementary Readings: Guha 1995*;* Scheidel 2023.

8. Post-Normal Science and Multi-Criteria Analysis for Decision-Making

1. Methodological foundations (substantive and procedural rationality, complexity, and post-normal science).
2. Structuring a multi-criteria problem (alternatives and criteria, weighting of criteria).
3. Main discrete multi-criteria approaches (Utility Approach, MAUT; Outperforming Methods; NAIADE).
4. Examples

Basic Reading: Munda 2004***;*** Funtowicz and Ravetz 2023***.***

Complementary Readings: Falconí y Burbano 2004; Martí et al., 2000; Comas et al., 2012.

9. Trade and the Environment

1. Determinants of Trade: Absolute and Relative Advantages
2. International Trade Governance (WTO)
3. Environmental Implications of International Trade
4. 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 Readings: Falconí et al., 2017; Ramos-Martin etal., 2017; UNCTAD 2022; Pérez 2006; Espinoza et al., 2016; Peinado 2018.

10. Biodiversity Economics and Governance

1. The Timeline of Biodiversity Governance: From the Convention on Biological Diversity (1992) to the Nagoya Protocol (2010)
2. Generating Value from Biodiversity (Appropriation Mechanisms)
3. The Nagoya Protocol and the Multilateral System of Access to Genetic Resources
4. Fair and Equitable Distribution of Access to Genetic Resources: Monetary and Non-Monetary Benefits

Basic Reading: ***Martínez Alier y Roca Págs. 558-571; Níjar 2011; Common and Stagl 2005: 521-527, 534-537.***

Complementary Readings: Vogel 2004, Reyes 1996.

11. Climate Change Economics and Governance

1. Greenhouse Effect and Global Warming
2. Climate Change Governance (UNFCCC and IPCC)
3. Kyoto Protocol, Paris Agreement, National Communications, and NDCs
4. 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 Readings: Falconí et al., 2019; Fernández-Reyes 2016; CEPAL 2015.

12. Analysis of the metabolism of societies

1. Input-Output Analysis
2. Material Flow Analysis
3. Energy analysis, energy accounting, eMergy, exergy
4. Multiscale Integrated 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 Readings: 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 etal., 2015; Giampietro 2023a.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Seminars	8	0.32	CM42, CM43, SM54, CM42
Theortical classes	40	1.6	KM55, KM56, SM53, SM54, KM55
Type: Supervised			
Tutoring	17	0.68	SM53, SM53
Type: Autonomous			
Information research	10	0.4	KM56, SM53, KM56
Studying	61	2.44	KM56, SM53, KM56

The classes will focus on presenting the conceptual foundations and fundamentals of ecological economics, as well as discussing its applicability in the current context. Current phenomena related to the use of energy and materials at the national and global levels will be analyzed, along with their impacts on both nature and distribution conflicts.

For each class, students must have read the required bibliography for each session and will address any questions they may have to the instructor. The multidisciplinary approach of ecological economics requires a substantial degree of independent work from students, which should include the recommended readings, in addition to the required readings, and discussions with the instructor and in the classroom on 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
Written assignment	30%	10	0.4	CM42, CM43, SM53
1st partial exam	35%	2	0.08	KM55, KM56, SM53, SM54
2nd partial Exam	35%	2	0.08	KM55, KM56, SM53, SM54

CONTINUOUS ASSESSMENT
The continuous assessment for this course will consist of:
- 2 partial knowledge exams, which may combine multiple-choice and thematic questions and will each count for 35% of the final grade.
- A written assignment, which will count for 30% of the final grade.

SINGLE ASSESSMENT
Students who choose the Single Assessment for this course must take a single exam on the date indicated in the calendar and must also submit their individual assignment on that day. The final grade will be calculated using the following weighting: 70% for the exam and 30% for the assignment.

REPOSITION
If students fail the course, whether the continuous assessment or the single assessment, they have another opportunity to pass the course through a reposition exam, which will be held on the date set by the degree coordinator. In this exam, 70% of the grade, corresponding to theory and seminars, may be repositioned. The written assignment cannot be repositioned. If the student exceeds a minimum grade of 3, 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 assignment.

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Software

Not needed.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Spanish	second semester	afternoon
(TE) Theory	1	Spanish	second semester	afternoon