

Ecology and Sustainability

Code: 106226
ECTS Credits: 6

Degree	Type	Year	Semester
2504235 Science, Technology and Humanities	OB	2	2

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

External teachers

Javier Benayas del Álamo
José Antonio González Novoa

Prerequisites

There are none.

Objectives and Contextualisation

The emerging process of Global Environmental Change, derived from the model of nature-society relationships that has prevailed for more than half a century, has led many scientists and a good part of our society to conclude that we are experiencing a true crisis of civilization, associated with one of the worst moments in the history of humanity in its relations with ecological systems. However, a good part of the scientific community, especially those researchers that work within the framework of Sustainability Sciences, transdisciplinarity and systemic thinking, also considers that the current social-ecological crisis constitutes a real opportunity to address the complex interactions between ecological and human systems from new perspectives; an excellent opportunity to challenge current paradigms and rethink many behaviors at an individual and social level that are clearly unsustainable. In the new era of the Anthropocene, continuing to do the same is no longer an option if we aspire to achieve a development model that is socially fair for all humanity and environmentally sustainable on a planetary level. To initiate this much-needed ecological transition towards sustainability, it is essential to generate important changes in the worldviews and values of society, to rethink and transform the current relationships between humans and ecosystems.

In this context, the objective of the subject is to provide students with the necessary knowledge to understand the dynamic and complex interactions between ecosystems and human well-being, as well as to provide them with the necessary tools to address current social-ecological problems. from a systemic and integrative perspective, under the conceptual umbrella of Sustainability Sciences.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.

- Assess the social, economic and environmental impact when acting in this field of knowledge.
- Relate terrestrial dynamics and the variable of time in the terrestrial, atmospheric and climatic processes, and identify the problems generated by use of natural resources on the part of humans.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

Learning Outcomes

1. Apply the knowledge acquired in complex or professional work settings.
2. Critically evaluate the applications of the knowledge acquired, based on criteria of equity and sustainability.
3. Identify your own training needs in the field of study, work or professional practice, and organise your own learning.
4. Relate the different living beings to each other and to their surroundings.
5. Respect diversity in ideas, people and situations.

Content

The subject is structured in 12 thematic units:

1. Global Change: the human impact on the ecosphere
2. Anthropocene: the age of humans
3. Biophysical bases of sustainability: the ecosphere as a system
4. Structure and functioning of ecosystems
5. Thermodynamics and energy flows in the ecosystem
6. Biogeochemical cycles in the ecosphere
7. Biodiversity and ecosystem services
8. Ecosystems and human well-being: the social-ecological systems framework
9. Ecological-distributive conflicts: ecological bases of poverty and inequalities
10. Economic bases for the sustainable management of ecosystems
11. Governance and institutions: bases for landscape planning and management
12. Sustainable Development Goals and ecological transition

Methodology

Throughout the course, theoretical classes will be combined with problem-based learning and cooperative work, applied to current issues related to sustainability and nature-society relationships.

The following methodologies will be used throughout the course:

- a. Theoretical classes: consisting of the oral exposition by the professor of the fundamental theoretical contents of each of the thematic units. Audiovisual material (powerpoint presentations) will be used in these classes, which will be available to students on the online teaching page (Moodle).
- b. Classroom seminars: monographic sessions on current problems related to sustainability. Six seminars will be held throughout the course. In these seminars, text readings, role plays, or videos will be used to generate debates among the students. In each session, questions will be raised that the students must solve and submit a document at the end of the session, which will be evaluable.
- c. Practices: a single practice will be carried out, with the students divided into two teams. In this practice, the free software "Caladeros" will be used to make a simulation game of different fisheries management models and their impact on sustainability. The students will have to make a team essay of practices, which will be evaluable.
- d. Excursions: two field excursions will be carried out throughout the course in which students will be able to observe in situ the effect on the sustainability of different models of forest resource management and environmental management at the municipal level.
- e. Problem-based learning (PBL): throughout the course, students divided into working teams will explore a specific case study in which the nature-society relationships and the effects on sustainability will be addressed. The theme of the specific problem that will correspond to each team will be assigned from the beginning of the

course and there will be a final delivery and an oral presentation of the work prepared by each team.

f. Tutorships: throughout the course there will be tutorships with the teaching staff to monitor progress in the PBL work of each group.

g. Personal study: autonomous learning academically supervised by the teaching staff, which will consist of the analysis of previous readings (flipped classroom method) or the active search for scientific information on specific sustainability problems.

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			
Learning exercises	16	0.64	1, 4, 5, 2
Lectures	33	1.32	1, 3, 4, 5
Type: Supervised			
Essay supervision	4.25	0.17	1, 3, 2
Type: Autonomous			
Autonomous study	33.75	1.35	1, 2
Group written essays	40	1.6	1, 5
Reading scientific papers	12	0.48	5, 2

Assessment

The evaluation will be carried out based on four criteria:

- Continuous evaluation based on six individual exercises carried out throughout the course in the "classroom seminar" sessions (20% of the final grade).
- Team report developed throughout the course on a case study (40% of the final grade).
- Oral presentation of the team report and subsequent discussion (10% of the final grade).
- Individual exam, based on the integration of contents and the critical analysis of a scientific reading (20% of the final grade).
- Team essay on the practice (10% of the final grade).

At the time of completion of each evaluation activity, the teacher will inform the students (Moodle) of the procedure and date of review of the qualifications.

The student will receive the grade "Not evaluable" when they have not participated in the preparation and presentation of the group essay, when they have not taken the individual exam, and in those cases in which they have not delivered a minimum of 50% of the evaluable exercises corresponding to the seminar sessions in the classroom.

Recovery procedure:

To participate in recovery, the student must have been previously evaluated in a set of activities whose weight is equivalent to a minimum of 2/3 of the total grade. Oral presentations and group work will be excluded from the recovery process. To recover these activities, the student must do a substitute individual work.

If the student commits any type of irregularity that may lead to a significant variation in the grade of an evaluation act, it will be graded 0, regardless of the disciplinary process that may result from it. If several irregularities are verified in the evaluation acts of the same subject, the final grade for this subject will be 0. In addition, those evaluation activities in which irregularities have been detected will not be recoverable.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam	20%	2	0.08	1, 3, 2
Exercicis in seminar sessions	20%	2	0.08	1, 4, 5, 2
Oral presentation and discussion of essay	10%	1	0.04	1, 4
Team essay on a case study - Problem Based Learning	40%	4	0.16	1, 5
Team essay on practical work	10%	2	0.08	4, 5

Bibliography

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- Duarte, C. et al. 2009. *Cambio Global. Impacto de la actividad humana sobre el Sistema Tierra*. CSIC. Madrid.
- Gunderson, L.H., C.S. Holling. 2002. *Panarchy. Understanding transformations in human and natural systems*. Island Press. Washington, D.C.
- Martínez Alier, J. 2004. *El ecologismo de los pobres. Conflictos ambientales y lenguajes de valoración*. Icaria. Barcelona.
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- Molles, Mc. C. 2006. *Ecología: Conceptos y aplicaciones*. Mac Graw-Hill. Barcelona.
- Naredo, J. M. 2006. *Raíces económicas del deterioro ecológico y social. Más allá de los dogmas*. Siglo XXI. Madrid.
- Odum, E.P., Barret, G.W. 2005. *Fundamentals of Ecology*. 5th ed. Thompson Brooks/Cole, Belmont, USA.
- Smith, R.L., Smith, T.M. 2001. *Ecología*. Addison-Wesley. Madrid.
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Software

In the practices of the subject, the "Caladeros" software will be used, developed by professors of the Department of Ecology of the Autonomous University of Madrid, with an open Creative Commons license.