

Degree	Type	Year
2504604 Environmental Sciences	OB	2

Contact

Name: Daniel Campos Moreno

Email: daniel.campos@uab.cat

Teachers

Joan Escuer Solé

Teaching groups languages

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

Prerequisites

In order to follow and integrate properly the contents of this course it will be necessary to have taken (and passed, preferably) previously the courses of 'Fonaments de Física', 'Fonaments de Geologia' i 'Fonaments de Química'.

Objectives and Contextualisation

This course should provide the students the ability to assess and quantify the main sources of natural resources that human beings have available to develop their basic functions and/or their economic activities (in particular the transformation and production of energy), and up to what extent such resources are being used and/or overexploited nowadays in our society.

Likewise, the course will introduce the main processes used for extracting and processing such resources, and what is their expected evolution for the following decades (in particular within the context of the energy transition). It will also provide the students with tools to quantify and assess critically the physic, energetic, economic and environmental costs/impacts associated to such uses and processes.

Learning Outcomes

1. CM46 (Competence) Contrast the different current and future options for environmental risk management, especially in the context of resource management, human health, and global and climate change.
2. KM57 (Knowledge) Identify the complex network of knowledge necessary to comprehensively address the main contemporary challenges in environmental science.
3. KM60 (Knowledge) Compare the political, social and cultural dimensions of the development of science and technology at different historical stages, as well as their impact on the environment and on the human condition.
4. KM62 (Knowledge) Identify the main concepts and technologies involved in the management of natural and energy resources, as well as their distribution and consumption.
5. SM55 (Skill) Integrate different types of scientific, technological and social knowledge necessary for the in-depth analysis of environmental processes related to human health, climate change, and environmental management in companies, among others.
6. SM56 (Skill) Identify the main threats associated with the use of the natural environment and their corresponding restoration mechanisms on a local and territorial scale.

Content

1. Introduction: the global problem of the finiteness of energy and natural resources
2. The exploitation and consumption of resources in our society
3. Transport and distribution of energy in the current models
4. Fossil fuels
5. Extraction and management of nuclear fuels
6. Geothermal resources
7. Hydroelectric resources
8. Eolic resources
9. The energy from the Sun
10. Storage and recovery/reutilization of resources and energy
11. Future scenarios: the energy transition
12. Case studies

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Gamified activities in the classroom	8	0.32	CM46, KM57, KM60, KM62, SM55, SM56

In-class lectures	38	1.52	KM57, KM62, SM55, SM56
Visits to UAB Campus facilities related to energy efficiency	2	0.08	KM62, SM55, SM56
Type: Autonomous			
Autonomous work	86	3.44	CM46, KM57, KM60, KM62, SM55, SM56
Tutorials	10	0.4	CM46, KM57, KM60, KM62, SM55, SM56

The course includes 38 teaching hours of theory (including both lectures and practical demonstrations in the classroom), 8 teaching hours of seminars (where two interactive and cooperative activities will be developed, based on role-playing and serious games methodologies, to reproduce different case studies related to the management of natural resources and energy) and 2 teaching hours of external visits to several facilities available at the UAB Campus related to the consumption and management of energy in the university.

Additionally, the course includes a certain number of hours devoted to personal study (which includes both theoretical study and consultation of sources through the Internet and/or other channels), plus those hours that the students will need to prepare the different assignments during the course.

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	35/100	2	0.08	CM46, KM60, SM55
2nd partial exam	35/100	2	0.08	CM46, KM60, SM55
Gamified activities in the classroom	30/100	2	0.08	CM46, KM57, KM60, KM62, SM55, SM56

i) The evaluation of the course will include two independent partial exams covering each a part of the contents of the course, each representing a weight of 35% over the final grade.

ii) Additionally, there will be two interactive and cooperative activities in group based on a role-playing games (to be developed during the last 3/4 weeks of the semester) based on practical case studies/projects. These activities will involve several assignments and/or oral presentations that will represent globally a 30% of the final grade, and will imply compulsory attendance to all the sessions where the activities are developed.

iii) Finally, as a part of the evaluation of the course, the attendance to the external visits included in the course program will give the student the right to present an assignment that will increase the final grade of the course up to 0,5 points.

To pass the course the student will have to:

i) Get a minimum average grade of 5 (over 10).

ii) Get a minimum grade of 3,5 (over 10) in each of the three main evaluation activities (the two partial exams and the interactive activities). In case this requirement is not fulfilled the final grade that will appear in the expedient will be (i) the average grade in case it is below 4,5, (ii) 4,5 in case it is above this value.

It will be considered that a student will obtain the qualification of "Not Assessable" if does not present the assignments (assignments and/or oral presentation during the interactive activities), and/or does not appear in any partial exam.

Retake:

i) Those students that have attended a minimum part of the evaluation activities (corresponding at least to 2/3 of the final grade) but do not get the minimum grade to pass the course, or that want to improve their grades, have the option of a retake exam that will be independent for each partial.

ii) The interactive activities, as well as all assignments in the course, will not have a retake option.

Given the characteristics of some of its evaluation activities, this course does not offer the option of a Unique-Assignment evaluation.

Bibliography

Books

V. Ruiz. El Reto Energético. Almuzara, 2013 (2a ed).

J. González-Velasco. Energías Renovables. Reverté, 2005.

C. Riba Romeva. Recursos Energètics i crisi. Octaedro, 2012.

D. Yergin. The New Map: Energy, Climate and the Clash of Nations. Penguin Books, 2021

R.L. Jaffe and W. Taylor. The Physics of Energy. Cambridge Univ. Press, 2018

D.J.C. Mackay. Sustainable Energy: Without the Hot Air. (<https://www.withouthotair.com/>)

B. Cassoret. Energy Transition. Taylor & Francis, 2021.

IEA Reports

World Energy Outlook. <https://www.iea.org/reports/world-energy-outlook-2023>

The Role of Critical Minerals in Clean Energy Transitions.
<https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>

Clean Energy Transitions Programme 2022.
<https://www.iea.org/reports/clean-energy-transitions-programme-2022>

Technology Innovation to Accelerate Energy Transitions.
<https://www.iea.org/reports/technology-innovation-to-accelerate-energy-transitions>

World Energy Investment 2023. <https://www.iea.org/reports/world-energy-investment-2023>

Global EV Outlook 2023. <https://www.iea.org/reports/global-ev-outlook-2023>

Renewable Energy Policies in a Time of Transition.
<https://www.iea.org/reports/renewable-energy-policies-in-a-time-of-transition>

Recommendations of the Global Commission on People-Centred Clean Energy Transitions.
<https://www.iea.org/reports/recommendations-of-the-global-commission-on-people-centred-clean-energy-transitions>

IRENA Reports

Critical Materials For The Energy Transition.
<https://www.irena.org/Technical-Papers/Critical-Materials-For-The-Energy-Transition>

Managing Seasonal and Interannual Variability of Renewables.
<https://www.iea.org/reports/managing-seasonal-and-interannual-variability-of-renewables>

Financing clean energy transitions in emerging and developing economies.
<https://www.iea.org/reports/financing-clean-energy-transitions-in-emerging-and-developing-economies>

Smart Electrification with Renewables.
<https://www.irena.org/Publications/2022/Feb/Smart-Electrification-with-Renewables>

Innovation landscape for smart electrification.
<https://www.irena.org/Publications/2023/Jun/Innovation-landscape-for-smart-electrification>

Innovation landscape for a renewable-powered future.
<https://www.irena.org/publications/2019/Feb/Innovation-landscape-for-a-renewable-powered-future>

Community-Ownership Models.
https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jul/IRENA_Community_ownership_2020.pdf

Capturing Carbon. <https://www.irena.org/Technical-Papers/Capturing-Carbon>

Scenarios for the Energy Transition.
<https://www.irena.org/publications/2020/Sep/Scenarios-for-the-Energy-Transition-Global-experience-and-best-practices>

Other Reports

IPCC. Mitigation of Climate Change 2022. <https://www.ipcc.ch/report/ar6/wg3/>

World Energy Council: Five Steps to Energy Storage.
https://www.worldenergy.org/assets/downloads/Five_steps_to_energy_storage_v301.pdf

Technical support for RES policy development and implementation.
<https://op.europa.eu/en/publication-detail/-/publication/949ddae8-0674-11ee-b12e-01aa75ed71a1>

EEA: Energy Prosumers in Europe. <https://www.eea.europa.eu/publications/the-role-of-prosumers-of>

Carbon dioxide removal: Nature-based and technological solutions.
[https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2021\)689336](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)689336)

Recursos online

Demanda Red Eléctrica Española. <https://demanda.ree.es/visiona/home>

Global Wind Atlas. <https://globalwindatlas.info/en>

European Wind Atlas. <https://map.neweuropeanwindatlas.eu/>

Photovoltaic Geographical Information System. https://re.jrc.ec.europa.eu/pvg_tools/en/

Global Solar Atlas. <https://globalsolaratlas.info/map>

Energy Transition Model. <https://energytransitionmodel.com/>

De l'Euro al Joule. <https://www.eur2j.cat>

Central Gorona del Viento. <https://www.goronadelviento.es/>

Web d'Energia de la UAB. <https://www.uab.cat/web/energia-1345825228693.html>

Software

Excel

Language list

Name	Group	Language	Semester	Turn
(SEM) Seminars	1	Catalan	second semester	morning-mixed
(SEM) Seminars	2	Catalan	second semester	morning-mixed
(SEM) Seminars	3	Catalan	second semester	morning-mixed
(SEM) Seminars	4	Catalan	second semester	morning-mixed
(TE) Theory	1	Catalan	second semester	morning-mixed