Universitat Autònoma de Barcelona

2022/2023

Environmental Energy and Resource Management

Code: 104528
ECTS Credits: 6

Degree	Type	Year	Semester
2503743 Management of Smart and Sustainable Cities	OB	1	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: Yes

Teachers

Genis Riba Sanmarti
Xavier Font Segura
Carles Gasol Martinez

Prerequisites

As it is a first year course, it is not obligatory to have taken any course previously. In any case, in order to take this course, it is necessary:

- Written and oral communication skills;

- Intermediate level of Catalan, Spanish and English, which allows written and auditory comprehension in the three languages, and

- Intermediate level of office automation -MS Office or other free softwares - especially in managing spreadsheets, texts and presentations.

Objectives and Contextualisation

The objective of this subject is twofold. On the one hand, it aims to provide basic knowledge about the economic, social and territorial context in which the energy and resource management systems operate in advanced societies. On the other hand, it aims to enhance understanding on some of the tools that allow to evaluate the functioning of aforementioned systems. The two objectives are addressed by different thematic focus. The first objective is addressed by taking energy as thematic focus while the second objective takes resources as a thematic focus.

The subject introduces the effect of socio-economic and territorial elements in the energy and resource system with a high level of technical complexity. Thus, the configuration and evolution of these systems does not only respond to a technical or technological component but more so conditioned by other issues such as diverse the legal and administrative framework, urban and territorial environment, business structure, geopolitic, global economy, consumption patterns and the demands of the population, and awareness of the society.

The first part of the course, mainly focusing on energy, will be looking at these issues in detail. It will cover geographical and historical context, and different components of an energy system. Energy markets are explained from the description of the three major groups of agents: suppliers, consumers and the administration. Lastly, the course will describe some of the impacts of the current energy model onour society and will try to highlight some of the solution proposed at the planning stage.

As for the second objective, to acquire a global vision of environmental management, it will provide students with fundamental concepts of sustainability and knowledge about the main tools of sustainability. The content of this course covers mainly topics of life cycle assessment and environmental risk assessment with practical examples based on environmental resource management.

Competences

- Analyse and model urban and regional dynamics using methodological instruments for qualitative and quantitative analysis.
- Demonstrate creativity, initiative and sensitivity in the different social and environmental topic areas.
- Identify and interpret social, economic, technological and sustainability challenges in different areas such as: town planning, infrastructures, mobility, urban economies, services and equipment, cultural diversity and social inequality, energy and natural resources, waste, etc.
- Measure the technological infrastructure necessary to respond to the needs of cities, understanding the interactions between technological, social and operational aspects of cities.
- Solve urban management problems using knowledge, methodology and procedures for the design and implementation of computer applications for different types of environment (web, mobile, cloud) and different paradigms.
- 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. Analyse and model processes in the field of energy, water cycle, control of atmospheric pollution and waste management, with special reference to the planning and management of those services and infrastructures necessary for this purpose.
2. Analyse urban environment from the perspective of the circular economy and sustainability.
3. Apply methods and techniques for treating environmental problems, of mobility and territorial planning.
4. Demonstrate creativity, initiative and sensitivity in the different social and environmental topic areas.
5. 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.
6. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
7. Use qualitative techniques for the study, modeling and planning of energy systems (generation, transport, distribution and consumption), mobility (infrastructure and flows) and territorial planning (urban planning and policies). The techniques mentioned include the elaboration and management of structured, semi-structured and open surveys, participant observation, the study of group dynamics and the management of participation processes.
8. Use quantitative techniques for the study, modeling and planning of energy systems (generation, transport, distribution and consumption), mobility (infrastructure and flows) and territorial planning (urban planning and policies). The techniques mentioned include the use of cost-benefit analyses, monitoring, construction of transport network graphs, matrix calculation of mobility flows, preparation of planning reports and SWOT analysis.

Content

Block 1: Energy

- Geographical context of energy
- Historical context of energy
- Energy systems: definition, components and requirements
- The role of the Administration and Planning: the EU, the State, the regional and local governments
- Energy supply: petroleum products, natural gas and electricity
- The functioning of the market for gas, electricity and petroleum fuels
- Energy consumption: characteristics and determinants
- Territorial and social conflicts
- Energy transition

Block 2: Environmental Management

- Sustainability
- Life cycle analysis
- Sustainable Cities
- Tools (mandatory and voluntary) to improve sustainability
- Urban Waste management
- Circular Economy

Methodology

The subject will be structured around two main classroom activities, theory classes and practical exercises. The practical exercises, carried out with a computer, will provide the students opportunity to practice how to look for information, and select, treat, analyse and represent data on the subjects explained in the theory class. It is aimed to follow the evolution of each student in the understanding and use of the tools applied in the subject.

Apart from the directed activities, the students will have to spend time outside the classroom to complete those practical exercises not finished in classes, as well as to carry out the recommended readings for each topic.

During the theory classes, students will ask open-ended questions that will allow them to demonstrate their creativity, initiative and sensitivity towards social and environmental issues (T02).

In order to carry out the practical exercises successfully, innovative and competitive proposals must be generated in the professional activity (T03). At the same time, the realization of practical exercises will allow to generate proposals to prevent and to solve problems, adapting to unforeseen situations and to take decisions (T04).

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			
Classroom exercises (practical)	30	1.2	3, 4, 7, 8
Lectures	30	1.2	1, 6, 5

Type: Supervised			
Conducting practical excercises	30	1.2	2, 3, 4, 7, 8
Oriented readings	10	0.4	5
Type: Autonomous			
Information search	10	0.4	3, 8
Reading and individual study	21	0.84	2, 5

Assessment

The evaluation of the subject will be done progressively and continuously throughout the semester. The evaluation system is based on the following learning evidences:

- The presentation of reports, in writing and orally, relating to computer practices, problems or case studies conducted during the course, with the aim of following the evolution of each student in the understanding and use of the tools worked in the subject. The presentation of reports will allow us to evaluate the capacity to generate innovative and competitive proposals in the professional activity (T03) as well as the capacity to prevent and to solve problems adapting to unforeseen situations and to take decisions (T04).
- An examination for each block and a final examination (in case of re-evaluation), to favour the consolidation of all the material covered during the course.

Evaluation criteria

The final grade will be the result of the weighted sum of the grades of the two modules:

Final grade = 50% Energy module (eq.1) + 50% Environmental module (eq.2)

The mark from each module will be calculated from the weighted sum of the grading of various activities:
The grade for Block 1 will be obtained based on below criteria:
GradeBlock1 = 50% (practices / projects) + 50% (exams) (eq.1)

The grade for Block 2 will be obtained from the weighted sum of the valuationsof the different evidences:

GradeBlock2 = 50% (practices) + 20% (exercices) + 30% (exam) (eq.2)

In the case of the Environmental Block, it is necessary to attend to the opral presentation of the practioses, to be able to pass the course.

The qualification of the exam will take into account aspects such as: presentation of the exam, writing, making basic mistakes, modifying, if necessary, the final grade obtained from the weighted average of each of the grades.

For each block, to carry out the weighted sum, it will be a necessary condition that the all practices/projects are qualified (which implies that all the practices must be handed in) and that the grade obtained in the exams is equal to or greater than 5. It is important to emphasize that the practices must be done and be delivered to the dates indicated for this purpose by the teacher of the subject since they cannot be recovered later.

In the case of obtaining more than a 5 in the grade of one of the Blocks, according to the calculation corresponding to each Block, the corresponding part of the subject is released.

Re-evaluation

For those students who at the end of the evaluation process have not obtained a grade equal to or higher than 5 on the exam score, but have more than a 5 to the practice, there will be a re-evaluation. It will consist in the realization, in the date foreseen for the Faculty and programmed in the last week of the semester, of a representative examination of the situations worked during the course. The studentsonly have to present themselves to the theory part that they have not passed before the partial or final exam. If a student does not reach the minimum grade of 5 in exams or practices and for this reason does not pass the subject, he will have a 4.5 inthe final grade of thesubject. For repeat students, the theory grade of the passed parts is not saved from one course to another. However, the mark of the practice will be saved from one course to another.
With honors

Awarding an honors mark (MH) is the decision of the faculty responsible for the subject. UAB regulations indicate that MHs may only be awarded to students who have obtained a final grade equal to or greater than 9.00. Up to 5% MH of total enrolled students can be awarded.

Not eligible for evaluation

A student who has not taken an exam is considered "non-assessable". Otherwise, the evaluation criteria detailed above are followed.
Plagiarism or irregularities in the evaluation of the subject

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, irregularities committed by a student thatmay lead to a variation of the grade in an evaluable activity will be graded with a zero (0). Evaluation activities rated in this manner and by this procedure will not be recoverable. If it is necessary to pass any of these evaluation activities in order to pass the course, this course will be suspended directly, without the opportunity to recover it in the same course. These irregularities include, among others:

- the total or partial copy of a practice, report, or any other evaluation activity;

- allow copying;

- present a group work not done entirely by the members of the group (applied to all members, not just those who have not worked);

- present as their own materials produced by a third party, even if theyare translations or adaptations, and in general work with elements that are not original and exclusive to the student;

- have communication devices (such as mobile phones, smart watches, camera pens, etc.) accessible during individual theoretical-practical assessment tests (examinations);

- talk to colleagues during individual theoretical-practical assessment tests (examinations);

- copy or attempt to copy other students during theoretical-practical assessment tests (examinations); - use or attempt to use subject-related writings during the theoretical-practical assessment tests (examinations), where these have not been explicitly permitted.

In case of not passing the subject due to the fact that some of the evaluation activities do not reach the minimum required grade, the student will be graded the lowest value between 4.5 and the weighted average of the grades. Students who do not participate in any of the evaluation activities will be awarded the grade of "Not Evaluable", and also "Not Evaluable" is given to those that has grade lower than 3.0 and the weighted average of the grades, in case the student has committed irregularities in an evaluation act (and therefore there will not be any compensation or recoveryexam for this case). In future editions of this subject, the student who has committed irregularities in an act of evaluation will not validate any of the evaluation activities carried out.

In summary:copying, letting copy or plagiarize (or attempting to) in any of the evaluation activities result in a SUSPENSE, not compensable and without validation of parts of the subject in subsequent courses.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Energy Practices / projects	25%	7.5	0.3	1, 2, 3, 4, 5, 7, 8
Environmental Management Practices / projects	35%	7.5	0.3	1, 2, 3, 4, 5, 7, 8
Exam Block Energy	20%	1	0.04	1, 2, 6, 7, 8
Exam Block Environmental Management	15%	1	0.04	1, 2, 6, 7, 8
Participation Block Energy	5%	2	0.08	4, 7

Bibliography

Block 1: Energy

General reading

- Abramsky, k. (Ed.). 2010. *Sparking a Worlwide Energy Revolution: Social struggles in the transition to a postpetrol world.*Edinburgh: AK Press.
- Boyle, G. (Ed.). 2007. *Renewable electricit & the grid: the challenge of variability*. London: Earthscan Publications.
- Droege, P. (Ed.). 2009. *100% renewable: energy authonomy in action*. London: Earthscan.
- Fernández, R. y González, Luis (214): *En la espiral de la energía*. Madrid: Libros en Acción.
- Gore, A. 2007. *Una verdad incómoda: la crisis planetaria del calentamiento global y cómo afrontarla*. Barcelona Gedisa editorial.
- Greenpeace. 2007.*Renovables 100%: un sistema eléctrico renovable para la España peninsular y su viabilidad económica*. Madrid: Geeenpeace
- Hildyard, Nicholas, et al. 2014.*Seguridad energética ¿para qué? ¿para quien?.*Libros enAcción & The Corner House.
- Hopkins, R. 2008.*The transition handbook: from oil dependency to local resilience*. Vermont: Chelsea Green.
- Iraegui, J. I Ramos, J. 2004. *Gestió local de l'energia*. Barcelona: Fundació Pi i Sunyer
- La Vanguardia. 2014. *"La geopolítica de la energía*."*Dossier Vanguardia*Núm 53. Octubrediciembre 2014.
- Le Monde Diplomatique. 2014. "Batallas por la Energía". *Atlas de Le Monde Diplomatique*. Diciembre 2014.
- Patterson, W. 2007. *Keeping the light son: towards sustainable electricity*. London: Earthscan.
- Puig, J. 2004. "Prospectiva energética. Els contorns d'un nou model energetic I el process de transició". A: *La tecnología: llums i ombres*.Informe 2004 de l'Observatori del Risc. Barcelona: Institut d'estudis de la seguretat.
- Puig, J. I Corominas, J. 1990.*La ruta de la energía*. Barcelona: Anthropos.
- Riba, C. 2011. *Recursos energètics i crisi. La fi de 200 anys irrepetibles*. Barcelona: Universitat Politècnica de Catalunya.
- Sans, Ramon. 2014. *El col·lapse és evitable. La transició energètica del segle XXI (TE21*). Ediciones Octaedro.
- Romero, Cote i Barcia Magaz (eds.). 2014. *Alta tensión. Por un nuevo modelo energético sostenible, democrático y ciudadano*. Icaria.
- Ruiz, Valeriano, 2006. *El reto energético*. Almuzara
- Scheer, H. 2011.*Imperativo energético*. Barcelona: Icària
- Starke, L. (Ed.). 2009. *L'Estat del Món 2009. El planeta s'escalfa*. Informe del Worldwatch Institute sobre el progres cap a una societat sostenible. Barcelona: Centre UNESCO de Catalunya.
- The Economist. 2015.*Let there be light. Sepcial report on energy and technology*. January 17th 2015
- The Worldwatch Insititute. 2016. *Can a City Be Sustainable?.*State of the World. Washington.

Block 2: Environmental Management

- Göran Finnveden, Michael Z. Hauschild, Tomas Ekvall, Jeroen Guinée, Reinout Heijungs, Stefanie Hellw, 2009, Recent developments in Life Cycle Assessment, , 91: 1-21
- Sonnemann G, Castells F, Schuhmacher M, 2004 Integrated Life-Cycle and risk assessment for industrial processes, Lewis Publishers
- Riera P ,2000 Avaluació d'impacte ambiental , Departament de Medi Ambient, Generalitat de Catalunya
- Conesa, V., 2010, Guía metodológica para la evaluación del impacto ambiental, Ed. Mundi-prensa, 4a Ed.
- A banda deles lectures generals, per a cada tema es recomanaran dues o tres lectures o vídeos específics.

Software

SimaPro, MS Excel