

Academic Year/course: 2021/22

69753 - Energy and Circular Economy

Syllabus Information

Academic Year: 2021/22

Subject: 69753 - Energy and Circular Economy

Faculty / School: 100 - Facultad de Ciencias

Degree: 627 -

ECTS: 6.0

Year: 01

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

The Energy and Circular Economy course is designed to assess the main characteristics of energy sources and their use in Circular Economy. Energy consumption and the origin of these resources play a fundamental role in defining the circularity degree of a particular process or product since each of them presents a level of impact when considering their life cycle phases. The student will acquire a global vision of the characteristics of the different energy sources in their production, use, and dismantling phases, as well as the integration and optimisation possibilities they offer, analyzing their implications on sustainability and in the establishment of a Circular Economy.

The inverse problem will also be analysed, examining how energy-intensive sectors see their impact reduced when production processes address their challenges from a Circular Economy approach. The student will understand and know how to analyse the strong influence of Circular Economy principles in the massive decarbonisation process of the different society sectors, identifying action points within the energy flow and proposing improvement measures.

These approaches and aims are aligned with Sustainable Development Goal (SDG) No. 7 (Affordable and clean energy) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of learning results of the course provides training and competence to contribute to a certain extent to its achievement.

1.2. Context and importance of this course in the degree

Energy is one of the key pillars in the Circular Economy implementation since any production process of raw materials or final products consumes energy resources. Its massive requirement in the production processes together with the climatic problems associated with the high concentrations of GHG in the atmosphere derived mainly from the final energy production stage make the treatment of this service need its block within the Master's Degree in Circular Economy. The Energy and Circular Economy course is taught in the first semester to all students of the Master's Degree in Circular Economy. The subject is taught from the University of Zaragoza.

1.3. Recommendations to take this course

The student must understand and handle the thermodynamic properties of substances, basic concepts of technical thermodynamics, basic concepts of chemistry, and approach to mass and energy balances. Regular use of the teaching platform is recommended, reading the proposed documents (sufficient knowledge of English to handle documentation) and daily study of the concepts presented, placing special emphasis on the resolution of practical activities and the continuous development of the subject work. Likewise, it is important to consult the doubts and questions that pose difficulties in the teaching and learning process, for which it is recommended to use personalised tutorials.

2. Learning goals

2.1. Competences

BASIC COMPETENCES

CB6 - Have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the first cycle, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context.

CB7 - Can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within

broader (or multidisciplinary) contexts related to their field of study.

CB8 - Have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements.

CB9 - Can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and nonspecialist audiences clearly and unambiguously.

CB10 - Have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.

GENERAL COMPETENCES

CG1 - Obtain information in Spanish and English using information technologies efficiently

CG2 - Manage, critically analyze and synthesise information

CG3 - Critically reflect in a systemic way and using causal relationships

CG4 - Formulate, analyze, evaluate and compare in a multidisciplinary way new or alternative solutions for different problems

CG5 - Work in interdisciplinary groups

CG6 - Transmit information efficiently through information and communication technologies

CG7 - Develop management skills (decision making, goal setting, problem definition, design, and evaluation)

CG8 - Properly manage available resources on time

SPECIFIC COMPETENCES

CE3 - Understand the natural and technical cycles of matter and energy

2.2. Learning goals

The student, passing this subject, achieves the following results:

1. Being able to interpret the advantages and disadvantages of each energy source for Circular Economy.
2. Being able to show the relevant role of renewable energies.
3. To be able to apply the concepts of energy optimisation, saving, and storage both in the production and consumer sectors (industry, buildings, and transport).
4. Be able to identify the points of the energy path that can be considered in a circular economy and propose measures.

2.3. Importance of learning goals

Understanding the role of energy, especially renewable sources, in the implementation of the principles of the Circular Economy will give the student a global perspective that will be useful when joining research teams, Public Administration, or companies that want to study, promote or implement these principles. Obtaining the learning results should make it possible to assess the main characteristics of energy sources and their use in the Circular Economy.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

Evaluation activities

* **Reports (I).** Elaboration of two reports, each of them will consist of the elaboration of a memory, on a subject related to the subject, which could include brief reviews of the art, critical analysis of research articles or original works carried out by the student himself. It will be assessed if the report presents a coherent structure and raises the different contents of the same in a clear and logical way, providing original ideas and providing justifiable conclusions of the work. More specific guidelines on said structure, format, search for adequate bibliography and correct approach to the different sections will be provided through moodle. The reports will be sent to the teacher electronically.

* **Resolution of problems and cases (P).** The resolution of these two exercises constitutes an individual or group work of the students. Students must submit a report at the end of each session following the guidelines and presentation format that will be marked. ? Final multiple choice test (F1). The test will be held simultaneously at each university under conditions that guarantee the proper identification of students and the impossibility of fraud in them.

* **Final short, long and/or development answer test (scored as F2).** This part of the final test will include short questions of conceptual content and the development of problems / practical cases seen in the classroom. The test will be held simultaneously at each university under conditions that guarantee the proper identification of students and the impossibility of fraud in them. **Assessment criteria and levels of demand**

In all evaluation activities, the following aspects and qualities will be assessed to the degree indicated in each case:

- * Own performance of the tasks (essential): if plagiarism or fraudulent copying of the works were detected, the corresponding mark would be zero.
- * Correct approach to the procedure for solving the questions and problems raised (fundamental).
- * Accuracy of the result obtained.
- * Correction and clarity in written communication (fundamental): correct spelling, clear handwriting, correct expression, coherent content structure.

- * Critical analysis of the results (fundamental): coherence, relationship with other aspects of the subject...
- * Delivery within the stipulated period (fundamental): reports will not be accepted outside the deadline.
- * Delivery in the format and procedure indicated by the teacher.

Assessment procedures

1st Call

The student who wishes may carry out a continuous evaluation procedure that will contain the following elements

1st) Written tests. They will consist of questions of a theoretical nature and development of problems/cases. They will account for 30 % of the final grade.

2nd) Reports. The preparation, the intermediate deliveries and the two final reports will have a weight in the final grade of 45 %. They may be in Spanish or English, in which case an extra score will be eligible. The teacher may request oral presentation and defense of the reports delivered.

3rd) Resolution of problems and cases. It will account for the remaining 25 % and its evaluation will be based on the use of tutorials, the follow-up activities indicated by the teacher and the final written report presented.

Final qualification formula of the subject in continuous assessment: $0.45 \times I + 0.25 \times P + 0.3 \times (F1 + F2)$

To pass the continuous assessment, it will be necessary to obtain a grade equal to or greater than 4 out of 10 in each of the three previous sections and a grade equal to or greater than 5 out of 10 when considering the three together.

Students who do not pass or do not wish to take the continuous assessment will have the global assessment to which they are entitled by the regulations of the University of Zaragoza. This evaluation will consist of a written test, which will take place on the day assigned by the Center for the 1st official call, in which you can ask about any of the contents of the subject. Final grade formula for the course in global assessment: T

2nd Call

The procedure followed will abide by the regulations of the University of Zaragoza reflected in the Regulation of Learning Assessment Standards (<https://ciencias.unizar.es/normativas-asuntos-academicos>). Said document establishes that a global test will be carried out consisting of a written test that will be able to evaluate any of the contents presented in the subject.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

Learning on this course is based on the combination of expository method and flipped classroom.

According to the expository method, the professor develops the presentation of the topics before the students present in the same classroom or other universities through videoconference. In addition, other teaching materials will be included in the Moodle platform that will allow dedicating some of the classes to interact with students, posing questions that allow relating concepts.

Problem-Based Learning is an instructional and learning-oriented educational approach in which students tackle real problems in small groups and under the supervision of a tutor.

Project-oriented learning is based on situations in which the student must explore and work on a practical problem applying interdisciplinary knowledge. Project learning is an example of autonomous learning, in which students in small groups must develop a project or document as a result of applying the acquired knowledge to a specific case. The solutions to the problems or assumptions or the critical analysis of the case are evaluated. In the case study, the student is required to elaborate an argued solution regarding a question, solve a series of specific questions or carry out a global reflection. It involves the presentation of works and the teacher's feedback on them.

All these training activities will be supported by tutorials from teachers via videoconference.

4.2. Learning tasks

Master class: 10 hours

Problem and case solving: 5 hours

Teaching work: 49 hours

Study: 85 hours

Evaluation tests: 1 hour

4.3. Syllabus

1. Current energy uses .
2. Energy sources and technologies for their use.
3. Specific aspects of renewable energies: solar, wind, hydro, geothermal, other energy sources.
4. Environmental impacts of energy.
5. Centralised and distributed generation systems.
6. Energy saving and optimisation technologies.

7. Energy storage systems and processes.
8. Role of energy in Circular Economy.
9. Legislation and taxation.
10. Energy plans.

4.4. Course planning and calendar

Information on schedules, calendar, and exams is published on the Master's page on the website of the Faculty of Sciences of the University of Zaragoza (<https://ciencias.unizar.es/master-en-economia-circular>). Presentation of reports will be carried out according to the calendar that will be announced in due course through the Moodle page of the course.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=69753&Identificador=C74178>