

## 28961 - Energy uses of products and wastes

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 28961 - Energy uses of products and wastes

**Faculty / School:** 201 - Escuela Politécnica Superior

**Degree:** 583 - Degree in Rural and Agri-Food Engineering

**ECTS:** 5.0

**Year:** 4

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

The aim of this subject is that students of Agri-Food and Rural Engineering acquire a general vision of industrial processes that take advantage of the energy content of certain products and waste. The aim is to introduce students to the energy industry so that, during the exercise of their future professional activity, they will be able to identify the type of biofuel used and the effect of the main operating variables in the design of the process to obtain it.

These approaches and objectives are aligned with some of the Sustainable Development Goals (SDGs) of the 2030 Agenda and certain specific targets (<https://www.un.org/sustainabledevelopment/es/>): Goal 4 (Target 4.3), Goal 7 (Target 7.2), Goal 12 (Target 12.2), Goal 13 (Target 13.3).

### 2. Learning results

The student, in order to pass this subject, must demonstrate that:

1. Identify the most important aspects related to the energetic use of a product and specify the different industrial applications.
2. Identify the operating variables that most affect the design of a biofuel production process.
3. Solve questions or problems related to the balance of matter and energy that take place in an energy utilization process.
4. Perform flowchart calculations using Hysys.
5. Analyze current energy problems and study the evolution towards the use of renewable energy sources.

The learning results of the course encourage students to develop their sensitivity and critical capacity in relation to essential aspects for the rational use of resources and products, as well as the implementation of technologies and agroindustrial processes that respect the environment. Therefore, learning results 1 to 5 are aligned with the SDGs, in particular with the following targets they seek between now and 2030:

Target 7.2: Significantly increase the share of renewable energy in the energy mix.

Target 12.2: achieve the sustainable management and efficient use of natural resources

Target 13.3: Improve education, awareness and human and institutional capacity for climate change mitigation, adaptation, mitigation and early warning.

### 3. Syllabus

**Unit 1.** Energy issues.

**Unit 2.** Generation of energy from biomasses.

**Unit 3.** Types of biomass, residues and crops.

**Unit 4.** Energy uses of biomass, biogas, bioethanol, biodiesel, biomass.

**Unit 5.** Biomass and waste related technologies.

### 4. Academic activities

**Lectures:** 22 hours.

Theoretical-practical sessions in which the contents of the subject will be developed.

**Problems and cases:** 10 hours.

Solving problems related to the contents of the subject.

**Practical sessions.** 10 hours.

Practical cases will be solved using EES, EXCEL and Hysys software.

**Technical visits:** 8 hours.

*These activities are subject to the budget available for their implementation.*

**Personal study and independent work:** 70 hours.

**Assessment tests.** 5 hours.

*(1 ECTS is equivalent to 10 teaching hours)*

## 5. Assessment system

**Continuous assessment** through activities:

Activity 1. Energy issues. Written work and oral presentation of the same (25% of the final grade).

Activity 2. Generation of energy from fossil resources. Solving a biomass combustion problem. (25% of the final grade).

Activity 3. Study of the different types of biomass, residues and crops and their energy uses. Written work and oral presentation of the same (25% of the final grade).

Activity 4. Study of the waste treatment hierarchy and the different treatments related to the energy recovery. Completion and delivery of 2 practice scripts. (25% of the final grade)

In relation to the SDGs, evaluation activity 1 is related to Target 13.3, while activities 2, 3 and 4 are related to Targets 7.2 and 12.2.

If the subject is not passed by means of the continuous assessment, the student will have the opportunity to pass it by means of a global **test in** the two official calls, composed of the same activities as the continuous assessment test.

*The detailed definition of the assessment system will be explained in the presentation of the subject.*

The success rates for the subject in the last three years are: 2019/20: 100%; 2020/21: 100%; 2021/22: No students