# 28961 - Energy uses of products and wastes

**Información del Plan Docente**

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| **Academic Year** | 2017/18 |
| **Faculty / School** | 201 - Escuela Politécnica Superior |
| **Degree** | 437 - Degree in Rural and Agri-Food Engineering |
| **ECTS** | 5.0 |
| **Year** | 4 |
| **Semester** | Second semester |
| **Subject Type** | Optional |
| **Module** | --- |

## 1.General information

## 1.1.Introduction

## 1.2.Recommendations to take this course

## 1.3.Context and importance of this course in the degree

## 1.4.Activities and key dates

## 2.Learning goals

## 2.1.Learning goals

## 2.2.Importance of learning goals

## 3.Aims of the course and competences

## 3.1.Aims of the course

## 3.2.Competences

## 4.Assessment (1st and 2nd call)

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

## 5.Methodology, learning tasks, syllabus and resources

## 5.1.Methodological overview

The learning methodology designed for this subject is based on:

1. Participative lecture will be the method used during the development of the theoretical classes. With this method, it is intended to encourage the active participation of students by formulating questions and/or exercises that help break the monotonous rhythm of the sessions.

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2. In the practical sessions problems related to the theoretical contents will be solve. During their development, student participation and cooperative work will be encouraged.

3. In the practical sessions with Hysys flowcharts of various industries related to energy use be studied and resolved.

4. In the technical visits the students will acquire a practical and realistic view of the theoretical and practical contents studied in the course. Two visits are planned, corresponding to two different types of energy technologies.

## 5.2.Learning tasks

The program includes the following activities:

1. Theoretical classes. Classroom activity in which the contents of the proposed topics will be developed.

2. Practical sessions. Classroom activity in which problems related to the contents of the subject will be solved. They will be carried out in the computer room.

3. Technical visits. This activity includes two visits to industries related to optimization of energy.

4. Study. Personal study.

5. Tutorials.

## 5.3.Syllabus

**Theory programme**

1. The problems related to energy

2. Generation of energy from fossil resources

3. Types of biomass, waste and crops.

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

5. Technologies related to biomass and waste. Characterization, energy conversion technologies, resource optimization technologies

**Practical programme**

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* Biomass combustion

* Characterization of waste

* Waste Incineration

* Estimation of gas production in a landfill.

* Computer simulation of process using Hysys: MTBE production

## 5.4.Course planning and calendar

| Activity / Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Classroom activity | | | | | | | | | | | | | | | | | | | | | | 51 |
| **Theory** | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | **28** |
| **Practical sessions** | | | | 2 | 2 | 2 | 2 | | | 2 | | | | | | | | | | | | **10** |
| **Visits** | | | | | | | | | | | | 5 | | | 5 | | | | | | | **10** |
| **Evaluation** | | | | | | | | | | | | | | | | | | | 3 | | | **3** |
| Personal work | | | | | | | | | | | | | | | | | | | | | | 74 |
| **Individual work** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 8 | 8 | 8 | 3 | | | **74.0** |
| **TOTAL** | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 3 | 3 | 7 | 5 | 10 | 5 | 5 | 12 | 10 | 8 | 8 | 6 | | | 125 |

## 5.5.Bibliography and recommended resources

| | | |
|---|---|---|
| | **BB** | Biomasa, estado actual y perspectiva inmediata / editores, José Ignacio Linares Hurtado ... [et al.] ; autores, Jesús Fernández González ... [et al.] . Madrid : |

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| | Asociación Nacional de Ingenieros del ICAI : Universidad Pontificia Comillas, D.L. 2009 |
| **BB** | Camps Michelena, Manuel. Los biocombustibles / Manuel Camps Michelena, Francisco Marcos Martín . 2ª ed. rev. y amp. Madrid : Mundi-Prensa, 2008 |
| **BB** | Madrid Vicente, Antonio. La biomasa y sus aplicaciones energéticas / Antonio Madrid Vicente . 1ª ed. Madrid : AMV Ediciones, 2012 |
| **BB** | Tchobanoglous, George. Gestión integral de residuos solidos / George Tchobanoglous, Hilary Theisen, Samuel Vigil ; traducción y revisión técnica Juan Ignacio Tejero Monzón, José Luis Gil Diaz, Marcel Szanto Narea . - [1a. ed. en español, reimpr.] Madrid [etc.] : McGraw-Hill, D.L.1996 |
| **BC** | Tratamiento y valorización energética de residuos / Xavier Elias Castells, director . [Madrid] : Fundación Universitaria Iberoamericana : Díaz de Santos, D.L. 2005 |


The updated recommended bibliography can be consulted in:
http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=8122