Universidad Zaragoza

Academic Year/course: 2022/23

28961 - Energy uses of products and wastes

Syllabus Information

Academic Year: 2022/23
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

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. a wide range of teaching tasks is implemented such as:

- 1. The 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.
- 2. In the practical sessions, problems related to the theoretical contents will be solved. 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.

4.2. 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.

4.3. Syllabus

The course includes the following learning tasks:

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

- Biomass combustion
- Characterization of waste
- Waste Incineration
- Estimation of gas production in a landfill.
- Computer simulation of process using Hysys: MTBE production

4.4. Course planning and calendar

It is estimated that an average student should devote to this course (5 ECTS) a total number of 125 hours. Below the calendar hypothetical course is as follows:

Activity / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Classroom activity																
Theory	2	2	2	2	2	2	2	2	2		2	2	2	2	4	
Problems					2		2		2			2	2			
Practical sessions				2		2		2			2			2		
Team Work																
Visits																
Mentoring																
ECTS																
Evaluation																
Actividad No presencial																
Personal Work		2	2	2	3	3	3	3	3	4	3	3	3	4	4	4
Team Work					5			5			5			5		
TOTAL	2	4	4	6	12	7	7	12	7	4	12	7	7	13	8	4

4.5. 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 : 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 SEBASTIÁN NOGUÉS, F.; GARCÍA GALINDO, D.; REZEAU, A. Energía de la biomasa. Volumen I. 1ª ed. [s. l.]: Prensas Universitarias de Zaragoza, 2010. ISBN 9788492774913.

BB SEBASTIÁN NOGUÉS, F.; GARCÍA GALINDO, D.; REZEAU, A. Energía de la biomasa. Volumen II. 1ª ed. [s. l.]: Prensas Universitarias de Zaragoza, 2010. ISBN 9788492774913.

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 Díaz, Marcel Szanto Narea. [1a. ed. en español, reimpr.]. Madrid [etc.] : McGraw-Hill, D.L. 1996

BB 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://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28961