Universidad Zaragoza

Academic Year/course: 2024/25

66239 - Waste valorization processes. Biorefinery

Syllabus Information

Academic year: 2024/25
Subject: 66239 - Waste valorization processes. Biorefinery
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 531 - Master's in Chemical Engineering
ECTS: 6.0
Year:
Semester: First semester
Subject type: Optional
Module:

1. General information

The objective of this subject is to provide the student with scientific and technical knowledge on waste treatment processes and technologies, with a view to their use in a circular economy system, within the framework of a biorefinery.

2. Learning results

Upon completion of the subject, the student will be able to:

1.- Know the current recovery processes of the main waste generated.

2.- Analyse different recovery alternatives and select the most appropriate for a specific waste.

3.- Plan the valorisation of a waste.

4.- To design the process strategy to be implemented in a biorefinery.

5.-To determine operating conditions in the main stages of the process.

6.- To know the legal and environmental context of the industrial facility (biorefinery).

3. Syllabus

BLOCK 1.- INTRODUCTION

Types of valorisation: preparation for reuse, recycling, other types of recovery.

BLOCK 2.- REUSE AND RECYCLING INDUSTRIAL PROCESSES

Description of processes and technologies. Application to different wastes

National and regional waste plans.

Recovery of waste materials deposited in landfills.

BLOCK 3.- INDUSTRIAL ENERGY VALORISATION PROCESSES

Description of processes and technologies. Incineration with energy recovery, pyrolysis, gasification, biodiesel and biokerosene production.

BLOCK 4.- BIOREFINERIES. PROCESS STRATEGIES

Biorefinery concept.

Valorisation routes.

Platforms and intermediate products.

Integral valorisation of residual biomass.

4. Academic activities

35 class hours, distributed approximately into 3 hours per week. Theoretical content and concepts necessary for the resolution of practical cases will be presented.

15 hours of problem-based learning, distributed approximately into 1 hour per week. In them, problems and practical cases will be developed in companies of the sector and coordinated in content with the temporal evolution of the theoretical expositions.

10 hours of practices and company visits

24 hours of application work that will consist of development tasks, expansion, documentation, solving of cases proposed to the student.

60 hours of personal study and tutoring.

6 hours of assessment tests.

5. Assessment system

Option 1:

The assessment is global and includes:

a. Solving of works and cases proposed during the development of the subject. The corresponding deliverables will be of a periodic nature and will be graded by assessing their content, the understanding of the concepts demonstrated in them and the correct presentation.
b. Exam at the end of the subject.

The grade for the subject will be calculated according to the following formula:

Grade = 0.30***P*** + 0.70***E***

where: ***P is*** the grade obtained in the completion of the problems and the periodic deliveries, and ***E*** the grade of the final exam.

A minimum grade of 4.0 out of 10 is required in each part so it can be averaged and the subject considered as passed:

Option 2:

Those students who do not want/cannot follow the evaluation according to option 1, may choose to take an exam in the call (100% of the final grade). This exam will have similar characteristics to those of the final exam of option 1.

6. Sustainable Development Goals

7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure
12 - Responsible Production and Consumption