

Academic Year/course: 2022/23

29933 - Environmental engineering

Syllabus Information

Academic Year: 2022/23

Subject: 29933 - Environmental engineering

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

This subject includes theory and practice and its learning process is based on 2.4 ECTS of work done in-person (60 hours) and 3.6 ECTS (90 hours) of self-guided study. The programmed activities are detailed below.

The course material and laboratory instructions are available for the students at the subject website (Moodle platform) that can be found at <http://moodle2.unizar.es/add/>

4.2. Learning tasks

The course includes the following learning tasks:

On-site activities: 2.4 ECTS, 60 hours

1. Classroom-based sessions (TP1): 30 hours, 2 per week. Sessions with theoretical and practical contents. The units are presented encouraging class participation, reflexive and proactive attitudes.
2. Problem-solving and case studies (TP2): 15 hours, 1 per week. Some exercises and case studies will be done in order to complement theoretical sessions. Additionally, some of these sessions will be used to control the practical work that the student will prepare related to this subject.
3. Laboratory and simulation sessions (TP3): 10 hours divided into 5 sessions of 2 hours each. The student will develop practical skills related to pollution control processes, either based on simulation software or in laboratory work.
4. Evaluation (TP8): 5 hours. Besides obtaining a mark, evaluation is one of the steps of the learning process, where the students can check their degree of understanding of the presented concepts and their acquirement of the required competencies.
5. If possible, some visits to environmental facilities will be planned during the semester. These visits are voluntary for the students. Attendance will account for approximately 5 hours of on-site activities.

Off-site activities: 3.6 ECTS, 90 hours.

1. Study (TP7): **80** hours. Includes study and problem-solving. Continuous work by the student will be encouraged. Tutorials are also included in this section.
2. Teaching work (TP6): This task will consist in the elaboration of a supervised practical work.

4.3. Syllabus

The course will address the following topics:

Topic 0. Introduction. Present environmental issues. The 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs)

Section 1. Water pollution

Types and origin of water pollutants. Parameters characterization. Processes and operations in water treatment: physical, chemical and biological treatments. Water treatment facilities. Legislation.

Section 2. Air pollution

The atmosphere and its pollution problems. Types of air pollutants: primary and secondary pollutants. Particle collection and pollutant control systems. Legislation.

Section 3. Residues

Definition and classification of waste. Waste management and control. Recycling. Biological and thermal treatments for wastes. Landfills. Legislation.

Section 4. Integrated Environmental management tools

Integrated environmental authorization. Environmental impact assessment. Environmental management systems.

4.4. Course planning and calendar

Theoretical and practical lectures, as well as laboratory practices, are held according to the timetable set by the Faculty, and they are published before the start date of the course (<http://eina.unizar.es>). The lecturer will report about his/her tutorial timetable. Other activities will be planned according to the number of students and they will be announced with sufficient time. They will be available on <http://moodle.unizar.es>

4.5. Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=29933&year=2019