COURSE DATA

DATA SUBJECT

Code: 33116
Name: Treatment of emissions and residues
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	Emissions and waste treatment	ELECTIVES

COORDINATION

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SUMMARY

The subject Emissions and Waste Treatment is a subject that is taught on an optional basis in the first quarter of the fourth
year of the Degree in Environmental Science from the University of Valencia. This course consists of 6 ECTS credits and is integrated into the module Elective Courses within the thematic block "Environmental Management and Technology." The subject is presented as a complement of the subject Pollution Control Technologies and aims to deepen knowledge for pre-design and operation of key technologies to provide solutions to environmental problems. The course addresses in a comprehensive and integrated way the various control systems related to wastewater treatment, waste management and treatment, treatment of contaminated soils and treatment of air emissions.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Have taken the subject Pollution Control Technologies.

COMPETENCES / LEARNING OUTCOMES

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Capacidad de aplicar los procedimientos de análisis y diagnóstico medioambiental en los procesos de producción y evaluar las estrategias de minimización y producción limpia.

Capacidad de utilizar instrumentos de prevención y control contaminación: autorización ambiental integrada y comercio de derechos de emisión.

Conocer y saber aplicar los criterios de diseño y operación de los diferentes tratamientos aplicables a emisiones al aire, vertidos y residuos.

DESCRIPTION OF CONTENTS

1. Wastewater treatment

Unit 1. Wastewater characterization: Flow, composition of the pollutants of interest for the WWTP.
Unit 2. Pretreatment and primary treatment: Design and operation of screening, grit and grease removal, equaslisation, physical-chemical and primary sedimentation treatments.
Unit 3. Secondary treatment: Design and operation of activated sludge systems.
Unit 4. Tertiary treatment: Design and operation of precipitation/physical-chemical, filtration and disinfection by UV radiation treatments.
Unit 5. Sludge treatment: Design and operation of the thickened sludge, aerobic and anaerobic digestion and dewatering treatments.
Unit 6. Sustainable management of wastewater treatment plants: Energy consumption and sludge production minimising.

2. Urban waste management

Unit 7. Collection, transfer and transport of municipal solid waste.
Unit 8. Recovery of the organic fraction of waste: Composting. Design and operating criteria.
Unit 9. Valuation of the combustible fraction of waste: Incineration. Design and operating criteria.
Unit 10. Landfills: Methods and operating criteria. Recovery and subsequent use of landfills.

Unit 11. Particle control: Design and operation criteria of cyclones, fabric filters and electrostatic precipitators.
Unit 12. Acid gas control: Design and operation criteria to minimize and treat sulfur and nitrogen oxides emissions.
Unit 13. Control of other pollutants: Design and operation criteria to minimize and treat carbon monoxide,

3. Air pollution control

Unit 11. Particle control: Design and operation criteria of cyclones, fabric filters and electrostatic precipitators.
hydrocarbons, dioxins and furans, and VOCs emissions.

4. Management and treatment of contaminated soils

Unit 14. Exploration of potentially contaminated soils: Sampling and site characterization. Intervention, control and monitoring.
Unit 15. Systems for treatment and recovery of contaminated soils: Classification. Principles of operation.
Unit 16. Evaluation and selection of treatment alternatives: Technical and economic considerations.

5. Laboratory of emissions and waste treatment

Practice 1. Determination of kinetic and stoichiometric parameters of a wastewater treatment biological process. Off-line calibration using respirometric techniques, determination of the kinetics of the process.
Practice 2. Study of the contamination / decontamination of a soil.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	36,00
Laboratory	7,00
Computer classroom practice	4,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	30,00
Preparation of lessons	25,00
Preparation for assessment activities	20,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The methodology used in the course will consider the following aspects:

Theory sessions: We offer students an overview of the subject matter and will affect the key concepts to be developed, as well as
resources to be used for further preparation of the subject in depth. Being a subject eminently applied in these sessions will raise practical applications to enhance the assimilation of the concepts introduced.

Practical class sessions: These sessions, first the teacher will conduct a series of problems, each type of content they develop. In addition, students will work similar problems supervised by the teacher. Also propose practical applications for independent study students.

Laboratory practical sessions and computer classroom: The student will perform two laboratory practical sessions of 3.5 hours. The labs are facing pilot unit scale. Students will practice in pairs, integrated teams of 4-8 students depending on the practice to be performed. Each pair in one of the teams will handle a specific aspect related to the operation of the process.

After completing the experimental part will be scheduled two sessions of 2 hours in the computer room to develop the calculations associated with the results obtained in the laboratory. Each session will be an individual questionnaire for each of the practices. Finally, each team shall submit a report that integrates and encompasses all aspects covered in each session.

Attendance at laboratory sessions and classroom computer is a compulsory activity to pass the subject.

Tutorials: Students will be divided into small groups and participate in a mandatory 3 sessions of 60 minutes spread over the semester.
In them, the teacher will clarify concepts and resolve any doubts that may have arisen during the implementation of the proposed problems or work to evaluate.

EVALUATION

The evaluation of the course is based on the following aspects:

1. Continuous assessment. It will be based on:

- The student's participation in the teaching-learning process, taking into account the resolution of questions proposed in class, individually and/or in small groups. It will be valued at 10% of the final grade.
- The resolution of a series of problems or activities that the students will have to solve, individually or in small groups, and deliver on the indicated date. The exercises or activities handed in by the students will be valued with 10% of the final grade.
- The activities not submitted on the due date cannot be submitted at a later date.

2. Laboratory practicals (15% of the grade). It will be evaluated on the basis of the laboratory practice report (10%) and the individual questionnaires (5%).

3. Objective test: At the end of the semester, the student will have to take an individual objective test, consisting of an exam that will be valued at 65% of the final grade. This exam will consist of theoretical and practical questions and will have the purpose of verifying that the basic concepts of the course have been assimilated.

The course will be considered passed when the weighted average grade is equal to or higher than 5 (out of 10), provided that in the objective test a grade equal to or higher than 4 (out of 10) is obtained.

In order to apply for the advance of this course, students must take into account that they must have completed the compulsory activities indicated in the teaching guide of the course.

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

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