UAB
Universitat Autònoma de Barcelona

Environmental Technology

Code: 106930
ECTS Credits: 6

2024/2025

Degree	Type	Year
2503743 Management of Smart and Sustainable Cities	FB	1

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Having completed the subject of Matter Fluxes and the Water Cycle.

Objectives and Contextualisation

The objectives of this subject are:

1. To learn how to formulate non-steady-state material balances and energy balances in any system.
2. To delve into the waste cycle in cities and its treatment and valorization processes.

Learning Outcomes

1. CM03 (Competence) Relate the knowledge and skills of the subject with those provided by other technicians in interdisciplinary teams.
2. KM06 (Knowledge) Describe energy storage, generation and distribution systems, as well as the technologies, tools and techniques of environmental engineering.
3. SM04 (Skill) Analyse the characteristics of the different technological and infrastructural components of the different systems in urban environments.

Content

1.- Material balances without chemical reaction in non-steady state.

2.- Macroscopic energy balances

- Types of energy.
- Expression of the balance.
- Simplified forms.
- Energy balance in steady state.
- Heat energy balance.
- Mechanical energy balance.

3.- Waste

- Introduction
- Legal framework.
- Types of waste.
- Hierarchy in waste management.

4.- Municipal waste

- Typology, Generation, and Characterization.
- Minimization.
- Integrated Management Systems.
- Segregation and collection models.
- Destination.
- Management of the OFW (Organic Fraction of Municipal Waste).

5.- Waste treatment and valorization

- Composting.
- Anaerobic digestion.
- Thermal treatments.
- Landfills.
- Municipal Waste Treatment Facilities.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem lessons	28	1.12	
Theory classes	28	1.12	
Type: Autonomous			
Study	47	1.88	
Work-assignments	40	1.6	

In English:

The in-person sessions will be divided between theory classes and problem-solving classes in the classroom, which will be coordinated with the theory classes.

Problem-solving classes will include evaluative activities, that could be in grup or individually, depending on the activity.

After the first midterm, a group project/Case Study will begin, focusing on the management (collection and treatment) of waste from a municipality or neighborhood, chosen by the group members. The project will involve fieldwork such as surveys of waste service users and identification of points of good and poor system performance. Before starting the project, instructions on the required content will be provided. The project progress will be monitored through mandatory tutorials, where the progress will be assessed and will affect the project grade.

The course includes a mandatory attendance visit. Those who cannot attend the visit due to a justified reason (the same ones listed in the Engineering School regulations regarding the postponement of an exam) will be able to undertake an alternative evaluative activity, which will be mandatory in order to pass the course and will require a minimum grade of 5.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exams	60	4	0.16	KM06, SM04
Work assignments and class activities	40	3	0.12	CM03, KM06, SM04

Process and Scheduled Evaluation Activities

The course consists of the following evaluation activities:

Exams: Two partial exams will be conducted during the course. Each exam will account for 30% of the final grade. Exams will consist of questions related to the material covered in both theory and problem-solving classes and the external visit. The second partial exam may include concepts assessed in the first partial.

Project/Case Study: 25% of the grade. This portion of the grade is not recoverable.

In-Class Evaluative Activities: 15%. This portion of the grade is not recoverable.

The minimum grades required to pass the course are:

- First partial exam: 3.5
- Second partial exam: 5
- Case study: 5
- Overall grade: 5

Schedule of Evaluation Activities

Exams will be held according to the schedule set in the Degree's exam calendar.

Recovery Process

The recovery process is exclusively for students who have not passed the course through continuous assessment.

- Partial exams are eliminatory if the grade is equal to or higher than 5.
- The final grade calculation in the recovery process will be conducted in the same manner as continuous assessment and with the same minimum grade criteria.
- Group work and in-class evaluative activities are not recoverable.

Procedure for Reviewing Grades

For each evaluation activity with an individual weight of more than 25%, a location, date, and time for review will be specified where the activity can be reviewed in person. In this context, claims regarding the grade of the activity may be made, which will be evaluated by the responsible faculty member. If the student does not attend this review, the activity will not be reviewed subsequently. For other activities, the student will have a period of 48 hours from the moment the grade is published to request a review.

Grading

Awarding honors (MH) is at the discretion of the course's responsible faculty member. UAB regulations stipulate that MH can only be awarded to individuals who have obtained a final grade of 9.00 or higher. Up to 5% of MH can be awarded from the total enrolled. In this course, to be eligible for honors, in addition to the aforementioned criteria, a grade of 8.5 or higher is required in each evaluative activity and no exams should have been retaken.

If a grade lower than 5 is obtained in the Case Study, as it is not recoverable, the final course grade will be Fail. The final grade obtained will correspond to the lower grade between the project and the average of the exams.

If, after the recovery process, a final grade equal to or higher than 5 is obtained, but with a grade lower than the minimum required in any of the exams, it will be assessed as Fail. The final grade obtained will correspond to the exam with the lowest grade obtained in recovery.

A person who does not pass the course through continuous assessment and does not attend the partial exams recovery will be considered Not Evaluable.

Irregularities: Copying and Plagiarism

Copying in any evaluation activity will result in failing the course with a grade of 3 out of 10, with no opportunity to retake any recovery exams.

Evaluation of Repeating Students

There is no different evaluation system for repeating students. There is the possibility of retaining the grade from the previous year's project and in-class evaluative activities, provided that the repetition is not due to copying.

Unique Evaluation

The content will correspond to both theory and problem-solving sessions. The unique evaluation format will consist of the following tests:

1. Exams corresponding to the first and second partial exams ofthe course, of the same characteristics as those taken by the rest of the students (60% of the final grade).
2. An oral session, where the student must present a previously indicated topic followed by a question session about the presented work and general topics of the course (40% of the final grade). This part is not recoverable

The day of the unique evaluation will coincide with the day assigned to the second partial exam of the course and, if necessary, will be held on the day assigned for the course recovery following the same procedure as for continuous evaluation.

The minimum grade criteria to be applied will be:

- Minimum grade of 3.5 in the synthesis exam.
- Minimum grade of 5 in the oral session.

Bibliography

- *George Tchobanoglous, Hilary Theisen, Samuel A. Vigil. Gestión integral de residuos sólidos.* Editorial Mc Graw-Hill. 1994.
- Agència de Residus de Catalunya, www.arc.cat
- R. T. Haug. The Practical Handbook of Compost Engineering. Editorial CRC Press. 1993. (Disponible document electrònic: https://ebookcentral.proquest.com/lib/uab/detail.action?docID=5389526)
- Agència Europea del Medi Ambient, https://www.eea.europa.eu
- *Gilbert M. Masters Wendell P. Ela Pearson Introduccion a la ingenieria medioambiental* Prentice Hall. ISBN 978-84-8322-444-1. 2008
- Himmelblau D. (1989) "Basic principles and calculations in Chemical Engineering". Prentice-Hall
- Aucejo, A. i col. (1999) "Introducció a l'Enginyeria Química" Pòrtic. Biblioteca Universitària. Ed. Enciclopèdia Catalana.

Software

N/A

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	611	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	612	Catalan	second semester	morning-mixed
(TE) Theory	61	Catalan	second semester	morning-mixed