

Degree programme	Type	Course
Environmental Sciences	OB	3

Contact lecturer

Name : Adriana Artola Casacuberta

Email : adriana.artola@uab.cat

Teaching staff

Xavier Font Segura

Raquel Barrena Gomez

Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

Students must be able to work in solving equations, chemical formulation, stoichiometry, to find out molecular weight of elements, calculate number of moles, and conversion from one system of units to another.

Objectives

- To understand some relevant environmental engineering processes analyzing unit operations involved.
- To perform mass and energy balances in environmental systems.
- To understand the usefulness of matter and energy balances in the field of Environmental Sciences.
- To apply the concept of "ideal reactor" in environmental engineering.

Learning outcomes

- CM33 (Undertake a general assessment of the social, economic and environmental impact on industrial activities and facilities.) Undertake a general assessment of the social, economic and environmental impact on industrial activities and facilities.
- CM34 (Undertake partial environmental projects in the field of technology within a team.) Undertake partial environmental projects in the field of technology within a team.
- KM42 (Identify the principles in the main areas of environmental engineering.) Identify the principles in the main areas of environmental engineering.
- KM44 (Recognise the systems, equipment and facilities of environmental engineering and the associated industrial processes.) Recognise the systems, equipment and facilities of environmental engineering and the associated industrial processes.
- SM42 (Assess the analysis and synthesis strategies related to the environmental implications of industrial processes.) Assess the analysis and synthesis strategies related to the environmental

- implications of industrial processes.
- SM43 (Extract relevant information from engineering or technological projects related to environmental issues.) Extract relevant information from engineering or technological projects related to environmental issues.

Contents

UNIT 1. INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Principles. Unit operations. Continuous and discontinuous operations. Steady and unsteady state.

UNIT 2. MASS BALANCES APPLIED IN SYSTEMS WITHOUT REACTION

Concept of balance. Applicability of balances. Applicability of mass balances in Environmental Sciences.

Mass balances in systems without reaction under steady state operation. Balances in multiple units systems. Systems with recycle, purge, and bypass flows. Mass balances

in systems without reaction operating under unsteady state.

UNIT 3. MASS BALANCES APPLIED IN SYSTEMS WITH REACTION

Stoichiometry. Measurement of changes in composition. The rate of reaction. Ideal reactors' design equations. Comparison among ideal reactors.

UNIT 4. ENERGY BALANCES

Forms of energy. The general energy balance. Simplified forms. Energy balance at steady state. Heat energy balance. Mechanical energy balance.

APPLICATION OF MASS AND ENERGY BALANCES: LIFE CYCLE ASSESSMENT.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Collaborative learning	34	1.36	
Theory lectures: Master classes on the concepts of the syllabus with application examples.	28	1.12	
Problems classes: Resolution of problems corresponding to the subject. Discussion with the students about the solution strategies and their execution.	14	0.56	
Autonomous learning	60	2.4	
Seminars	6	0.24	

Theory lessons: presentation of the different topics of the syllabus. During theory lessons and as a

fundamental part of the learning process examples of application for these topics will also be presented.

Problem classes: resolution of exercises related to the subject. Discussion with the students about the solving strategies and their execution.

Seminars: practical application of the basis of environmental engineering on environmental sciences. Some "exam like" exercises will be proposed as well as questionnaires and other activities. Some deliverables will be proposed to be evaluated.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Second exam	45%	3	0.12	CM33, CM34, KM42, KM44, SM42, SM43
Different evaluable activities	10%	2	0.08	KM44, SM42, SM43
First exam	45%	3	0.12	CM33, KM42, KM44, SM42

The subject consists of the following evaluation activities:

- Two partial exams including theory and exercises (45% each exam)
- Assessable activities: assessable activities will be scheduled in both theory classes and seminars, consisting of short problems, questionnaires, etc. (10%).

Non-participation in any of these evaluation activities will be assessed with a zero.

For a student to pass the subject through continuous assessment it is necessary to obtain a minimum weighted grade of 5 in the global of the subject. To be able to make a weighted average between the assessable activities and the grade of the partial tests, a minimum average grade of 4 out of 10 of the partial tests will be required with a minimum mark of 3 in each of the partial tests.

If grade 5 is not achieved globally, the student may undergo a resit exam only if he/she has been previously evaluated in a set of activities that represent a minimum of two thirds of the total qualification of the subject. The resit exam has two parts, each of them corresponding to one of the partial exams. The student must solve the part (or parts) not passed. In this case, assessable activities mark remains unchanged. The calculation of the final grade, in the resit process, will be done in the same way as in the continuous assessment and with the same minimum grade criteria.

For each partial exam (individual weight of more than 20%), a review place, date and time will be indicated where the activity can be reviewed in person. If the student does not undergo this review, the activity will not be reviewed later. For the rest of the activities, the student will have a period of 48 hours, from the moment the grade is published, to request a review.

Following UAB regulations, students with a grade of 9.0 or higher in a subject may be qualified by an Honors degree. The number of Honors degrees awarded to students cannot be higher than 5% of the total number of students enrolled in a subject. In this subject, in order to qualify for the Honors degree, in addition to the previous criteria, a grade equal to or higher than 8.5 in each of the assessable activities is needed. Also, students taking any resit exam will be excluded.

A student will be considered non-evaluable (NA) if he/she has not participated in any of the evaluation activities.

Students coursing the subject for a second or third year must undergo the above listed evaluation activities.

Without prejudice to other disciplinary measures, and in accordance with current academic regulations, any irregularities committed by the student that could lead to a variation of the score of an evaluation act will be marked with a zero. Therefore, copying or allowing to copy in an evaluation activity will imply a zero (0). Evaluation activities graded in this way and by this procedure will not be recoverable. Having communication devices such as mobile phones, smart watches, etc. accessible during the evaluation activities is also considered cheating.

Unique assessment. Students who have accepted the single assessment modality must take a final synthesis test on the date marked in the exam calendar as the second exam. This test will consist of a theory part (30% of the mark) and a problem part (70% of the mark). If the final grade does not reach 5, the student has another chance to pass the subject by means of the resit exam (on the date marked for the make-up exam of the subject).

Use of artificial intelligence tools: The use of artificial intelligence tools is not permitted during evaluation activities.

Bibliography

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Software

No specific software is recommended.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	first semester	morning-mixed
(PAUL) Classroom	1	Catalan	first	morning-mixed

practices			semester	
(SEM) Seminars	1	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	first semester	morning-mixed
(SEM) Seminars	2	Catalan	first semester	morning-mixed