Universitat Autònoma de Barcelona

2019/2020

Basic Environmental Engineering

Code: 102819
ECTS Credits: 6

Degree	Type	Year	Semester
2501915 Environmental Sciences	OB	3	2

Contact

Name: Ernest Marco Urrea
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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Adriana Artola Casacuberta
Xenia Juan Diaz
Ernest Marco Urrea

Prerequisites

Students must be able to solve equations, chemical formulation, stoichiometry, to find out molecular weight of ele

Objectives and Contextualisation

- To understand some environmental processes and analyze the unit operations.
- To perform mass and energy balances in environmental systems.
- To apply the concept of "ideal reactor" in environmental engineering.
- To know the basic principles that underlie the most relevant biological treatments in environmental engine

Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Demonstrate adequate knowledge and use the most relevant environmental tools and concepts of biology, geology, chemistry, physics and chemical engineering.
- Demonstrate concern for quality and praxis.

- Demonstrate initiative and adapt to new situations and problems.
- Information from texts written in foreign languages.
- Learn and apply in practice the knowledge acquired and to solve problems.
- Teaming developing personal values regarding social skills and teamwork.
- Work autonomously

Learning Outcomes

1. Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
2. Analyze and use information critically.
3. Apply relevant knowledge of basic sciences to enable compression, the description and the solution of typical problems of environmental engineering.
4. Apply the basic principles on which is based environmental engineering and, more specifically, mass and energy balances.
5. Demonstrate concern for quality and praxis.
6. Demonstrate initiative and adapt to new situations and problems.
7. Distinguish different operations of reaction, separation, processing and transportation of materials and circulation of fluids in industrial processes involved in environmental engineering.
8. Information from texts written in foreign languages.
9. Learn and apply in practice the knowledge acquired and to solve problems.
10. Teaming developing personal values regarding social skills and teamwork.
11. Work autonomously

Content

1. INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Principles. Unit operations. Continuous and discontinuous operations. Steady state and unsteady state. Type of r

2. MASS BALANCES APPLIED IN SYSTEMS WITHOUT REACTION

Concept of balance. Mass balances without reaction under steady state. Balance in multiple units. Systems with

3. MASS BALANCES APPLIED IN SYSTEMS WITH REACTION

Stoichiometry. Measurement of changes in composition. The rate of reaction. Ideal reactors design equations. Co

4. ENERGY BALANCES

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

5. BIOLOGICAL PROCESSES IN ENVIRONMENTAL ENGINEERING

Classification. Wastewater treatment: activated sludge. Anaerobic digestion. Composting.

Methodology

Theory classes: classes on the topics of the syllabus.
Problem classes: solving problems related to the subject. Discuss with th
Seminars: practical application of the basis of environmental engineering

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problems classes: Resolution of problems corresponding to the subject. Discussion with the students about the solution strategies and their execution.	14	0.56	3, 4, 9, 6, 5, 7, 8, 10
Seminars	4	0.16	3, 4, 9, 6, 5, 7, 10
Theory classes	28	1.12	2, 3, 4, 6, 5, 7, 8, 1, 11
Type: Autonomous			
Autonomous learning	60	2.4	2, 3, 4, 9, 6, 7, 8, 1, 11
Collaborative learning	38	1.52	2, 3, 4, 9, 6, 7, 8, 10

Assessment

The subject consists of the following evaluation activities:

- Two partial exams consisting of a theory and problems (45% each exam)

- Delivery of solved problems (10%).

Non-participation in any of the specific tests will be assessed with a zero.
To be able to pass the subject through continuous assessment it will be necessary to obtain a minimum average grade of 5 in the average of the subject. In the case of not exceeding this grade, the student may be submitted to a recovery exam provided that it has been submitted to a set of activities that represent a minimum of two thirds of the total qualification of the subject. The score of the delivery of the problem can not be recovered.
For each evaluation activity, a place, date and time of revision in which the student can review the activity with the faculty will be indicated. In this context, claims may be made on the activity evaluated. If the student does not appear in this review, this activity will not be reviewed later.
A distinction can be given to students who score 9.0 or higher in a subject. The number of distinctions awarded to students cannot be higher than 5% of the total number of students enrolled in a subject. If the total number of students is lower than 20 then only one distinction will be awarded.

A student will be considered non-evaluable (NA) if he/she has not submitted to the theory exam or the recovery exam.
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

scored with a zero. Therefore, copying or allowing to copy a practice or any other evaluation activity will imply a zero (0) in the attitude note and, therefore, suspend the course.

Repeaters are obliged to pass the full course.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Delivery of solved problems	10%	0	0	2, 3, 4, 9, 6, 11, 10
First exam	45 %	3	0.12	4, 9, 6, 5, 7, 8, 10
Second exam	45%	3	0.12	2, 3, 4, 6, 5, 7, 8, 1, 11

Bibliography

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- Izquierdo J.F. i col. (2011). Introducción a la Ingeniería Química. Problemas resueltos de Balances de Materia y Energía. Editorial Reverté.
- Davis M.L., Cornwell D.A. (1991) "Introduction to Environmental Engineering". McGraw-Hill,
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- Himmelblau D. (1989) "Basic principles and calculations in Chemical Engineering". Prentice-Hall
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- Costa, J. i col. (1991) "Química Técnica : Introducción a los Procesos, las Operaciones Unitarias y los Fenómenos de Transporte en Ingenieria Química". Ed. Reverté.
- Stephenson, T. (2002) "Process Science and Engineering for Water and Wastewater Treatment" IWA Publishing
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