25210 - Foundations of environmental engineering

Información del Plan Docente

Academic Year	2016/17
Academic center	201 - Escuela Politécnica Superior
Degree	277 - Degree in Environmental Sciences
ECTS	6.0
Course	2
Period	First Four-month period
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process that is designed for this subject is based on the following:

The classroom theoretical sessions (28 hours) consist mainly in participatory lectures. Among these include those dedicated to solving problems (5 sessions of 2 hours), in which the participation of students will be promoted more intensively than in the exhibition dedicated to the theoretical content. Likewise, 4 2-hour class sessions are contemplated for the resolution of cases by computer in a computer room. In cases Computer resolution of a practical problem, especially focused on applying engineering concepts to the field of environmental science arises.

Laboratory practices (5 sessions of 2 hours) face, consist of carrying, in groups of 3 students, making experimental data

practices included in the program of laboratory practices. Later, as a non-contact activity, it is recommended that each student prepare a report containing the results of the measurements and the answers to the questions raised in the corresponding script prior to performing practice, each student must have read. **Students will be provided through the teaching intranet solutions to the issues raised in the scripts of practices for self-evaluation. However, in the period between two consecutive sessions of practice, the professor will address questions about the preparation of the report of the last practice done. Although the report is not evaluable, it is recalled that students may consult the written exam of laboratory practice.**

5.2.Learning activities

The program is offered to students to help achieve the expected results v includes the following activities:

Theory and Problems : Study subject taught in classes of theory and solving problems of each topic, both solved by the teacher in the classroom, as proposed to be resolved by the student. Students will have Problems Solutions for self-evaluation. The estimated time These tasks will be between 1.5 and 2 hours of study for each hour of class.

Computer Cases : Resolution Computer (Excel and UES) of cases in the Field of Environmental Engineering. It is recommended that the student solve the cases raised in the classes. Students will have a teacher Through Intranet Solutions a self resolved in the classroom to their cases. This activity will be assessed through written examination of theory and problems.

Laboratory Practice : preparation of the reports of the practices in the laboratory is recommended. The estimated time for This task will be 2 hours, approximately, para Each of the Six Practices The student has to perform in classroom sessions 5 2 hours.

Test Preparation : a commitment of 8 hours for final review and reviewing all the matter of the subject, which have been included in the section on individual work in pre-face examination 4-hour weeks is estimated.

5.3.Program

**Theory Program **

Module I: Concept of Environmental Engineering

- Item 1: Introduction to Environmental Engineering

Module II: Balances of matter and energy

- Item 2: Material balances
- Item 3: Energy balances

Module III: Indices environmental quality

- Item 4: Quality indices

Module IV: physical separation processes

- Item 5: Physical gas cleaning processes
- Item 6: Physical processes of purification of liquid I
- Item 7: Physical purification processes liquid II

Module V: Process of chemical and biological purification

- Item 8: Chemical purification processes
- Item 9: Biological purification processes

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Lab program

Module II: Balances of matter and energy

- Practice 1.- Heat Exchangers
- Practice 2.- Adsorption

Module IV: physical separation processes

- Practice 3.- Filtration
- Practice 4.- Sedimentation

Module V: Process of chemical and biological purification

- Practice 5.- Water softening by ion-exchange resins.
- Practice 6.-

  Kinetics of oxidation of organic matter with
  H 2 O 2 in the presence of UV light.

5.4.Planning and scheduling

Schedule sessions and presentation of works

It is estimated that an average student should devote to this subject a total of 150 hours, which should include both classroom activities and non-attendance. Dedication to that, the user must be spread evenly throughout the semester. With this provision, the weekly load in hours Student is reflected in the following schedule:

Schedule weekly student load hours

Type activity / week	1	2	3	4	5	6	7	8	9	10	11
Classroom activity											
Theory	2	2	2	1	2	2	2	2	2	2	2
Problems	2		2				2		2		
Laboratory practices						2		2		2	
Computer cases		2			2						2
ECTS tutorials											
Evaluation											
No classroom activity											
Individual work		3	3	3	3	3	2	3	3	3	3

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Team work				2	2	2	2	2	2	2	2
TOTAL	4	7	7	9	8	9	8	9	9	9	9

Type activity / week	12	13	14	15	16	17	18	19	20	21	Total
Classroom activity											60
Theory	1	2	2			2					28
Problems	2										10
Laboratory practices		2				2					10
Computer cases			2								8
ECTS tutorials											0
Evaluation								4			4
No classroom activity											90
Individual work	3	3	3	7	7	7	7	4			70
Team work	2	2									20
TOTAL	9	8	7	7	7	8	8	8			150

5.5.Bibliography and recomended resources

BB Engineering and Environmental Sciences / Mackenzie L. Davis, Susan J. Masten; technical review, Maria Aurora Lanto Arriola, Juan Manuel Moreyra Market. McGraw-Hill 2004

BB Bases of environmental / engineering Vicenta Andrés Muñoz, Daniela Martin Nevskaia. UNED, 2007

BB Henry, J. Glynn. Environmental Engineering / J. Glynn Henry and Gary W. Heinke; With the participation of ... Ian Burton ... [et al.]. Mexico: Prentice-Hall, cop. 1999

BC Environmental pollution: a view from the chemical / Carmen Orozco Barrenetxea ... [et al.]. Madrid [etc.]: Thomson, D. L. 2002

BC Himmelblau, David M .. Balances of matter and energy / David M. Himmelblau; translation [of the 4th ed. English] José Luis Rodriguez Huerta; Gerardo Castañeda Saucedo technical review. [1st ed. reimp] Mexico [etc.]: Prentice-Hall, 1993

BC Introduction to chemical / Editor William Calleja Pardo engineering; Authors William Calleja Pardo ... [et al.]. Madrid: Synthesis, D.L. 1999

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LIST URLs:

Confederación Hidrográfica del Ebro

European Environment Agency

Gobierno de Aragón

United States Environmental Protectio