Universitat Autònoma de Barcelona

2021/2022

Chemistry of Pollution

Code: 102844
ECTS Credits: 6

Degree	Type	Year	Semester
2501915 Environmental Sciences	OB	3	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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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

Prerequisites

It is recommendable to have studies Química and Equilibri químic i Instrumentació

Objectives and Contextualisation

The objective is to provide tools and knowledge necessary to be able to understand and predict the behaviour of chemical substances in the environment and to asses the environemntal risks. Also the objective is to describe physicochemical procedures for remediation of contaminates environemtal systems.

Specific objectives:

1. Top understand the environmental relevance main physiscochemical properties that define the chemical compunds

2. Use of envirtonmental databases and use them for interpret environmental behaviour.

3. Draw up models that allow the prediction of the behaviour and fate of chemical contaminants.

4. Analyze and evaluate environmental risk of chemicals in the environment.

5. To know the chemical properties of natural environments

6. To know reactivity and persistence of chemicals in natural environments

7. Provide the necessary knowledge for the design of procedures of remediation.

Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Collect, analyze and represent data and observations, both qualitative and quantitative, using secure adequate classroom, field and laboratory techniques

- 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.
- Learn and apply in practice the knowledge acquired and to solve problems.
- Quickly apply the knowledge and skills in the various fields involved in environmental issues, providing innovative proposals.
- 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 chemical knowledge to solve problems in a quantitative or qualitative nature relating to the environment.
4. Demonstrate concern for quality and praxis.
5. Demonstrate initiative and adapt to new situations and problems.
6. Develop strategies for analysis and synthesis relating to the environmental implications of industrial processes.
7. Develop work type chemical analysis from previously established procedures.
8. Handle tools and equipment in chemical laboratories standards of environmental control.
9. Identify the chemical processes in the surrounding environment and evaluate them properly and originally.
10. Interpret data from databases or by experimental measures, including the use of computer tools, identify the meaning and relate behavior in environmental systems.
11. Learn and apply in practice the knowledge acquired and to solve problems.
12. Make correct assessments of health risks and environmental and socioeconomic impacts associated with chemicals and the chemical industry.
13. Observe, recognize, analyze, measure, and so properly and safely represent chemical processes applied to environmental sciences.
14. Recognize and analyze chemical problems and plan appropriate responses or work for resolution, including, where necessary, the use of bibliographical sources.
15. Safe handling of chemicals, taking into account their physical and chemical properties.
16. Teaming developing personal values regarding social skills and teamwork.
17. Work autonomously

Content

Part 1

Environemntal risk assessment of a contaminant

1. Envirobnmental fate of a contaminant.

2. Preparation of a tool for environmental risk assessment.

Part 2

Chemistry of terrestrial systems

Soil

3. Chemical properties

4. Sorption processes

5. Soil reactivity.

6. Soil contamination.

7. Remediation procedures

Hidrosphere

8. Chemical characteristics.

9. Chemical reactivity.

10. Contamination of water bodies

Part 3

Atmosphere

11. Chemical characteristics

12. Chemistry of stratosphere.

13. Chemistry of tropsphere

14. Chemistry of urban atmospheres

15. Effects and control of atmospheric contamination

Methodology

The subject will be developed through master classes, which will be complemented by problem sessions in order to consolidate the acquired knowledge and to develop the quantitative calculation of environmental parameters. Problem sessions will not form a segregated typology,
but they will be integrated into most cases in the
development of theoretical classes.
In the first block of the subject, in addition to theoretical classes and problems, there will be two practical sessions of 3 hours each, in computer room, for the realization of a practice in which the student will have to deliver a report, which will 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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
practical classes	6	0.24	2, 3, 11, 5, 4, 6, 7, 12, 9, 10, 8, 15, 13, 14, 17
problem solving classes	20	0.8	2, 3, 11, 5, 4, 6, 12, 10, 14, 17, 16
theoretical classes	33	1.32	
Type: Supervised			
tutorials	8.5	0.34	2, 3, 11, 5, 4, 13, 16

Type: Autonomous			
Autonomus study	64	2.56	3, 11, 4, 7, 12, 10, 8, 15, 13, 14, 17
Practices preparation	4	0.16	12, 10, 8, 15

Assessment

The evaluation will be carried out through partial tests, report of a practice and a additional test for those students tnat not have passed the course. The partial tests will correspond to the evaluation of the subject included in Block 1, consisting of a test, a test of problems and the report of the practice, and in the evaluation of Blocs 2 and 3, consisting of a written test with corresponding problems in the subject of Blocks 2 and 3 and in two tests. The final grade will be weighted according to the
weight of the three blocks. On the other hand, there will be a review of recovery
that will consist of a written test of the subject included in the three blocks. It must be kept in mind that in order to be able to attend the recovery test, the student will have to be evaluated in the continuous assessment activities equivalent to 2/3 of the final grade.
The minimum to consider the matter exceeded is 5 out of 10.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
practices report	15%	7	0.28	2, 3, 11, 5, 4, 7, 12, 9, 10, 8, 15, 14, 1, 17, 16
problem exam	25%	3	0.12	2, 3, 11, 4, 12, 9, 10, 14, 1, 17
test of part 1	10%	0.5	0.02	3, 11, 5, 12, 9, 14, 1
test of part 3	10%	0.5	0.02	2, 3, 11, 9, 10, 1, 17
test part 2	10%	0.5	0.02	2, 5, 12, 10, 14, 1, 17
written exam of parts 2 and 3	30%	3	0.12	2, 3, 11, 5, 4, 6, 12, 9, 10, 13, 14, 1, 17

Bibliography

The book will be followed during the course:

X. Domènech, "Fundamentos de Química Ambiental" Vol.1 y Vol.2. Ed. Síntesis. Madrid. 2014

Other reference books:

- X.Domènech, J. Peral, "Química Ambiental de Sistemas Terrestres". Ed. Reverté. Barcelona. 2006

- X. Domènech, "Química de la Contaminación". Ed. Miraguano. Madrid. 1999.

- X.Domènech, "Química atmosférica". Ed. Miraguano. Madrid. 2008.

- R.P. Wayne, "Chemistry of the Atmospheres". Oxford University Press. 2000

- C. Baird, Química ambiental. Reverté. Barcelona. 2014.

Software