

Degree	Type	Year
2504604 Environmental Sciences	OB	3

## Contact

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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 studied and passed the 1st year subjects of Fundamentals of Chemistry and Fundamentals of Physics, as well as Tool I: Statistical data processing.

## Objectives and Contextualisation

The main objective of the subject is to recognize the different types of pollution agents that affect the environment, both chemical and physical, determining their origin as well as their impact on health.

## Learning Outcomes

1. CM36 (Competence) Incorporate the use of environmental tracers or basic analytical techniques into the characterisation of specific processes of hydrology, oceanography, or pollutant dispersion.
2. CM37 (Competence) Present proposals for the prevention and mitigation of the impact on the physical environment of natural or anthropogenic action, including that based on green chemistry.
3. CM38 (Competence) Distinguish the most appropriate mathematical tools and models to describe the dynamics of specific environmental processes.

4. CM39 (Competence) Transmit general scientific information associated with an environmental problem to a general audience appropriately.
5. KM46 (Knowledge) Identify the most important chemical and geological processes in the different environmental compartments (hydrosphere, soil and atmosphere).
6. KM47 (Knowledge) Recognise the way in which human activity has an impact on the function of physical vectors (water, soil, oceans, atmosphere) in the natural environment.
7. KM49 (Knowledge) Recognise the techniques and tools for sampling, analysis and environmental tracers.
8. SM44 (Skill) Characterise the main consequences of pollution in the natural environment and associated transport mechanisms.
9. SM45 (Skill) Apply basic mathematical tools and models to describe the dynamics of environmental processes.
10. SM46 (Skill) Characterise the main processes of natural environments (marine, soil, atmosphere), including aspects of physics, chemistry, geology, biology and their interaction.
11. SM47 (Skill) Analyse changes in the physical environment caused by natural or anthropogenic action based on the data available.

## Content

UNIT 1: Introduction

UNIT 2: INORGANIC POLLUTANTS: General information. Elements: metallic and non-metallic. Other toxic inorganic compounds.

UNIT 3: Organic POLLUTANTS: General information. Oil derivatives. Chlorinated solvents. Pesticides. Polychlorinated biphenyls (PCBs). Polycyclic aromatic hydrocarbons (PAH). Medicines, food additives and cosmetics. Chlorofluorocarbons (CFCs).

UNIT 4: TRANSPORT OF POLLUTANTS: Diffusion and convection processes. Diffusion and thermal pollution. Odor pollution. Olfactory scales. Radiation contamination. Radioactive dose.

UNIT 5: ACOUSTIC AND LIGHT POLLUTION: Wave phenomena: intensity of a wave. Acoustic and radiance scales. Quality measurement systems and maps.

## Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory practices	7	0.28	CM38, KM46, KM49, SM44, SM45, SM46, SM47
Master classes	29	1.16	CM36, CM37, CM38, KM46, KM47, KM49, SM44, SM46
Practical examples (problem solving classes)	12	0.48	CM36, CM37, CM38, CM39, SM44, SM45, SM47
Type: Supervised			
Project preparation	6	0.24	CM37, CM38, KM46, KM47, KM49, SM45, SM47
Type: Autonomous			

Project preparation	38	1.52	CM37, CM38, KM46, KM47, KM49, SM45, SM47
Study work	50	2	CM38, KM46, KM47, KM49

### Teaching methodology and training activities

The training activities are divided into three sections: theory classes, problem classes, and laboratory practices, each with its specific methodology.

#### Theory classes

The teaching staff will explain the content of the syllabus with the support of audiovisual material that will be available to students on the subject's Virtual Campus. These expository sessions will constitute an important part of the theory section.

Under the guidance of the teaching staff and through communication through the Virtual Campus, the knowledge of some selected parts of the syllabus will have to be searched and studied through autonomous learning by the students. In order to facilitate this task, information about locations will be provided in textbooks, web pages, etc.

#### Problem solving classes

The number of students in the problem group(s) depends on the teaching plan programmed by the Departments of Physics and Chemistry to which the teaching work of this subject is requested.

The dossiers of problem statements of the subject by topics will be delivered through the Virtual Campus, which will be solved during some of the face-to-face problem sessions (programmed on the timetable from the Coordination of the Environmental Science Degree). In these sessions, the problem's teachers will explain the experimental and calculation principles necessary to work on the problems raised, explaining the guidelines for their resolution.

After the 1st term, this type of problem classes will be combined with intended problem classes to the guided preparation of a project.

#### Laboratory practices

Two laboratory practices are scheduled, one from each area of the subject (Physics and Chemistry) (programmed in the schedule from the Coordination of the Environmental Sciences Degree). The Scripts of each practice will be delivered through the Virtual Campus, as well as all related information of interest.

#### Material available on the subject's Virtual Campus

##### Teaching guide

##### Presentations used by teachers in theory classes

##### Dossiers of the problem classes

##### Scripts of laboratory practices

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
1st exam assesment	50%	2	0.08	CM38, KM46, KM47, KM49, SM45, SM47
2nd partial assesment	25%	2	0.08	CM38, KM46, KM47, KM49, SM45, SM47
Laboratory practices - Chemical part	5%	0.5	0.02	CM36, SM44, SM45, SM46, SM47
Laboratory practices - Physical part	10%	0.5	0.02	CM36, SM44, SM45, SM46, SM47
Project work in teams (presentation)	10%	3	0.12	CM36, CM37, CM38, CM39, KM46, KM47, KM49, SM44, SM45, SM46, SM47

The evaluation process follows the principle of continuous evaluation (continuous assesment). For the evaluation of the subject, the following will be carried out:

- A) Two partial term on the dates indicated by the faculty (and marked on the schedule of the Environmental Sciences Degree), each corresponding to a part of the subject. Partial tests are individual.
- B) Laboratory practices: The practices in each area are compulsory attendance, and will be evaluated and will have their own weight in the final grade of the subject. The evaluation mode will be notified through the subject's Virtual Campus. They will be done in pairs.
- C) Project related to the first part of the subject (part of the field of Chemistry). Work will be done in groups of 4 people.

The final mark of the subject will be distributed with 35% of the Physics part, and 65% of the Chemistry part. To pass the subject, students must obtain a final grade equal to or higher than 5.0.

Each area distributes its grade as follows:

65% of Chemistry: 50% will correspond to the grade of the 1st partial term; 10% of the preparation of a Project (in working groups); and 5% of laboratory practice.

35% of Physics: 25% will correspond to the 2nd partial grade; and 10% of laboratory practice.

The grade for each partial must be equal to or higher than 3.5, to be able to calculate the final weighted grade taking into account the other qualifications achieved in the other scheduled activities. The average grade of these two exams must be at least 5.0 to be able to calculate the final grade with the rest of the assessment activities.

If the project is not presented or the two laboratory practices are not attended, the student will be classified as "NOT ASSESSABLE", regardless of the grade of the partial exams. On the other hand, students who do not appear in the 1st semester will also be classified as "NOT ASSESSABLE".

The student who does not pass the assessment of the partial tests in section (A) will have an extraordinary assessment, on the dates determined by the faculty (and marked in the schedule of the Environmental Sciences Degree). In order to be able to take the extraordinary exam, students must have participated in assessment activities throughout the course that are equivalent to 2/3 of the final grade.

To recover the grade in section (A), the student must present himself for each of the partials with a grade lower than 3.5. In the event that the average grade of the partials is lower than 5.0, and the partials have a grade higher than 3.5, the student can decide to take the extraordinary assessment of both partials or only the assessment extraordinary of that partial that has the lowest grade.

The grade of the recovery exam will replace the previous grade in the calculation of the final grade. To be able to average for the final grade, the partial grade must be equal to or higher than 3.5.

Only the grade referred to in section (A) can be recovered. Regarding recovery, the grades for sections (B) and (C) remain unchanged.

Evaluation of students in 2nd or 3rd call ("repeaters")

Students who repeat the subject will not have to repeat the part of the laboratory practices (the grade for 2 consecutive calls will be saved). For the rest of the assessment activities, they will NOT be assessed differently from the rest of the students.

UNIQUE ASSESSMENT:

Students who have accepted the single assessment modality will have to take a final test, where the content of the entire subject will be assessed. The exam grade must be at least 5.0, and will have a weighting of 75%. On the same day of the exam (which will be held on the same day that the continuous assessment students are assessed for the 2nd partial) the Project for the field of Chemistry (which in this case will be individual) must be handed in, and will have a weighting of 10%. The practicals are also compulsory attendance and will have a weighting of 10% of the Physics part, and 5% of the Chemistry part.

If the final grade does not reach 5, the student has another chance to pass the subject through the extraordinary exam that will be held on the same day as everyone's extraordinary exam. Regarding this option, the grades for sections (B) and (C) will be the same.

Irregularities: copying and plagiarism

Without prejudice to other disciplinary measures that are deemed appropriate, irregularities committed by students that may lead to a change in the grade of an assessment act will be graded with a zero. Therefore, copying, plagiarism, deception, allowing copying, etc. in any of the assessment activities will involve failing it with a zero.

## Bibliography

### Basic literature

P.A. Tipler. Physics for Scientists and Engineers. WH Freeman (2020, 6th Ed)  
Fundamentals of Heat, Light & Sound (<https://pressbooks.nsc.ca/heatlightsound/>)  
D. Jou, J.E. Llebot, C. Pérez. Física para las Ciencias de la Vida. Mc Graw Hill (2009, 2a Ed)

Harris, Daniel C., ANÁLISIS QUÍMICO CUANTITATIVO.

Spanish version translated by Dr. Vicente Berenguer Navarro (High Professor of analytical chemistry at the *Universidad de Alicante*) and Dr. Ángel Berenguer Murcia (PhD in chemical sciences at the *Universidad de Alicante*), Editorial Reverté, 2016, Third edition (sixth original edition). ISBN 9788429194159 (PDF format). 9788429172256 (printed book). <https://elibro.net/es/ereader/uab/105686>

### Advanced literature

S.P. Arya. Air Pollution Meteorology and Dispersion. Oxford Univ. Press (1998)  
E. Boeker and R. van Grondelle. Environmental Physics: Sustainable Energy and Climate Change. Wiley (2011, 3rd Ed)

Casarett and Doull's. TOXICOLOGY. The Basic Science of Poisons, Ninth Edition. Editor Curtis D. Klaassen (University of Kansas), Mc Graw Hill, New York, 2019.

Manahan, Stanley E. Environmental Chemistry. Available from: VitalSource Bookshelf, (11th edition). Taylor & Francis, 2022.

Mark L. Brusseau, Ian Pepper, Charles Gerba. Environmental and pollution science. 3rd ed. Ed. Academic Press from Elsevier, London, 2019.

## Software

MS Word and MS Powerpoint for the presentation of the Project.

MS Word and Excel for laboratory practices.

## Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	1	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	2	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	3	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	4	Catalan	first semester	morning-mixed
(TE) Theory	1	Catalan	first semester	morning-mixed