



IDENTIFYING DATA

Pollution

Subject	Pollution			
Code	V02G030V01906			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Fernández Covelo, Emma			
Lecturers	Fernández Covelo, Emma Gomez Brandon, Maria González Rodríguez, Luis Mariño Callejo, María Fuencisla			
E-mail	emmaf@uvigo.es			
Web				
General description	Know of form updated the distinct sources and types of contaminants that affect to the half and to the biota Know the dynamics of the *contaminantes in the compartments of the ecosystem Know the processes of reuse of waste and biorremediación for recovery of environments contaminated http://bioloxia.uvigo.es/docs/docencia/horarios/hor_4grado_1sem1718.pdf			

Training and Learning Results

Code

- A1 Students should prove understanding and knowledge in this study field that starts in the Secondary Education and with a level that, even though it is supported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
- A2 Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
- A3 Students should prove ability for information-gathering and interpret important data (usually within their study field) to judge relevant social, scientific or ethical topics.
- A4 Students should able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
- A5 Students should develop the necessary learning skills to undertake further studies with a high degree of autonomy
- B2 Ability of reading and analyzing scientific papers and having critical assessment skills to understand data collection, deducing the main idea from the least relevant ones and basing on the corresponding conclusions.
- B3 Acquisition of general knowledge about the basic subjects of biology, both at theory and experimental level, without dismissing a higher specialization in subjects that are oriented to a concrete professional area.
- B4 Ability in handling experimental tools, both scientific and computer technology equipment that support the search for solutions to problems related to the basic knowledge of biology and with those of a concrete labour context.
- B5 Understanding of the levels of organization of living beings from a structural (molecular, cellular and organic) and functional point of view by observing their relations with the environment and other organisms, as well as their appearances in situations of environmental alteration.
- B7 Collection of information about issues of biologic interest, analysis and emission of critical opinions and reason them including the reflection about social and/or ethical aspects related to the issue.
- B10 Development of analytic and abstraction skills, the intuition and the logical and rigorous thought through the study of biology and its uses.
- B11 Ability to communicate in detail and clearly: knowledge, methodology, ideas, issues and solutions to all audiences (not only qualified but unskilled in Biology).
- B12 Ability to identify their own educational necessities in the biology field and in concrete labour areas and to organize their learning with a high grade of autonomy in any context.
- C3 Identifying, analysing and characterizing biological samples, including those of human origin, and possible anomalies.
- C6 Assessing and interpreting metabolic activities.
- C8 Assessing the functioning of physiological systems by the interpretation of parameters

C10	Analysing and assessing the adaptation of living beings to the environment.
C11	Sampling, characterizing, managing, preserving and restoring Populations, Communities and Ecosystems.
C13	Assessing environmental impact. Diagnosing and solving environmental issues
C14	Realising the analysis, control and purifying of waters.
C19	Identifying, addressing and communicating Agro-Food and environmental risks.
C21	Processing and interpreting bioessays and biological diagnoses.
C22	Identifying, describing and using bioindicators.
C23	Developing, managing and using biological control techniques.
C25	Gathering background information, develop experimental work and analysing data results
C31	Knowing and handling technical and scientific apparatus.
C32	Knowing and handling basic or specific key concepts and terminology
C33	Understanding the social projection of Biology.
D1	Development of capacity of analysis and synthesis
D2	Acquisition of the organization and planning capacity for tasks and time
D3	Development of oral and writing communication abilities
D6	Research and interpreting of information from different sources
D9	Ability to work in collaboration or creating groups with an interdisciplinary character
D10	Development of the critical thinking
D13	Sensitivity for environmental issues
D14	Adquisition of abilities in the interpersonal relationships

Expected results from this subject

Expected results from this subject	Training and Learning Results			
	A1	B2	C8	D13
Know the main sources, the diverse types and, especially, the dynamics of the more important pollutants and its relation with the biology		B3	C10	
Comprise the concept of environmental pollution and his effects on the organisms. It is important that understand the processes of treatments and biorremediation of the pollution	A1	B2	C3	D1
		B3	C6	D13
Know the diverse types of waste, his treatments and his use in processes of recovery in environments degraded	A1	B2	C11	D13
		B3		
Obtain an introductory vision of environmental toxicology, agroalimentary and in living beings	A4	B2	C8	D13
		B3	C31	
Know and understand in that cases has to be applied the valid legislation and the rules that develop it	A2	B2	C21	D1
	A5	B3		D3
		B7		D6
		B10		
Apply knowledges and technical own of the pollution in different processes related with the management of the half	A3	B2	C11	D2
		B5	C13	D3
		B10	C14	D9
			C19	D10
			C21	D14
			C22	
Apply knowledges and relative technology to the pollution in appearances related with the production, exploitation, analysis and diagnostic of processes and biological resources	A3	B2	C11	D2
	A5	B10	C23	D3
				D9
				D10
				D14
Obtain information, develop experiments and interpret results	A4	B2	C25	D2
	A5	B10		D6
		B11		D10
		B12		
Comprise the social projection of the pollution and its repercussion in the professional exercise	A5	B11	C33	D10
		B12		D13
Know and handle the concepts, terminology and scientific instrumentation-technical relative to the pollution	A5	B2	C32	D2
		B4	C33	

Contents

Topic	
1. INTRODUCCION To THE CONTAMINATION	- Definition. Basic concepts. Types and categories of contaminants. - Sources and roads of entrance to the environment and biota. - Dynamic of contaminants: distribution and flow. - Bioindicators, biomonitors. - Legislation and normative
2. BIODEGRADABLE WASTE	-Organic matter -Oil and derivative
3. ORGANIC POLLUTANTS	-PAHs, Hydrocarbons halogenados, PCBs

4. SOLID WASTE AND DISSIPATE	- Plastic and other solid waste - heat
4. INORGANIC POLLUTANTS	-Acidity -Elements potentially toxic
5. MICROBIAL POLLUTION	-Concept and sources of pollution of microbial origin -Microorganisms indicators of pollution -Dynamic of microbial pollution in atmosphere, floor and water -residual Waters and treatment. Treatment anoxic of lick. -Impact of the pollution in environment. -Legislation and normative on microbiological pollution
6. TREATMENT OF WASTE And PROCESSES OF RECOVERY	- Biorremediation. - Composting. - Reuse of waste through the system am used to-plant - Recovery of floors contaminated
7. BIOLOGICAL EFFECTS OF The CONTAMINANTS	-Exhibition of alive organisms the contaminants. Routes of entrance. Toxicocinética. Bioaccumulation, Biotransformation. -Effects of the contaminants to physiological level. -Molecular and cellular mechanisms of action of the contaminants. -Essays of toxicity. -Effects of the contaminants to populational level and of communities of organisms. -Evolution of resistance.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	20	10	30
Seminars	8	8	16
Mentored work	1	63	64
Lecturing	20	10	30
Objective questions exam	2	2	4
Report of practices, practicum and external practices	1	2	3
Problem and/or exercise solving	1	2	3

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Laboratory practical	Effect of a contaminant in the soil: it will study the total content and the availability. Effects on germination, growth and other physiological parameters of plants. Effect in the reproduction of oligoquetos and integrity of the lysosomal membrane and microbiological analysis of the solution of the floor. Detection of microbiological indicators of pollution. The assistance to practices will be compulsory to be able to surpass the matter
Seminars	It will complement the theoretical part tackling appearances that in the remained clear what was necessary to complement. Resolution of doubts, etc. At the end of the explanation of each subject, will deliver to the students a questionnaire of questions referred to the same and that they will have to deliver in the term that was fixed conveniently. In the part of Microbiology, the students will cover a test in the classroom when finishing the explanation of each one of the ones of the subjects.
Mentored work	The students will have the help of the professors of the matter for the preparation of the work of practices
Lecturing	Theoretical development-practical, presentation of objectives and conceptual frame of each subject, presenting specific bibliography and examples related

Personalized assistance

Methodologies	Description
Lecturing	
Laboratory practical	
Seminars	

Assessment

Description	Qualification	Training and Learning Results

Beiras, R., **Marine Pollution: sources, fate and effects of pollutants in coastal ecosystems.**, Ed. Elsevier. UK., 2018

Lipp, W.C., E. B. Braun-Howland, T.E. Baxter (eds)., **Standard Methods for the Examination of Water and Wastewater. 24 th.**, A.P.H.A., A.W.W.A. and W.E.F. Washington., 2023

Recommendations
