



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			
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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 bioassays 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	Acquisition of abilities in the interpersonal relationships

Expected results from this subject

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

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	<ul style="list-style-type: none"> - Plastic and other solid waste - heat
4. INORGANIC POLLUTANTS	<ul style="list-style-type: none"> -Acidity -Elements potentially toxic
5. MICROBIAL POLLUTION	<ul style="list-style-type: none"> -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	<ul style="list-style-type: none"> - Biorremediation. - Composting. - Reuse of waste through the system am used to-plant - Recovery of floors contaminated
7. BIOLOGICAL EFFECTS OF The CONTAMINANTS	<ul style="list-style-type: none"> -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

Objective questions exam	Final control of the matter by means of a questionnaire of short answers and/or test. The evaluation of this control will suppose 30% of the total qualification of the matter. It is precise to reach a 5 to do average with the practical note.	30	A1 A2 A3 A4 A5	B2 B5 B7 B10 B11 B12	C10 C13	D1 D2 D3 D6 D9 D10 D13 D14
Report of practices, practicum and external practices	The integrated report of the practices of edaphology, zoology, vegetal physiology and microbiology will be realised in the format of scientific article according to the norms of the Environmental Pollution. At the beginning of course and in each one of the practices of the matter will realise indications of the requirements of them. It will be necessary to approve this part to surpass the matter	40	A1 A3 A4 A5	B2 B3 B4 B7 B11	C3 C6 C11 C13 C14 C19 C21 C22 C23 C25 C31 C32	D1 D2 D14
Problem and/or exercise solving	Evaluation of the participation of the student in the seminars, assistance to theoretical classes, etc. The professors will be able to request the delivery of questionnaires or test of each subject (a questionnaire, or test, of each one of the subjects that appear in the apartade of contents.).	30	A2 A3 A4 B7 B10	B2 B3 B5 C10 C13 C19 C23 C32 C33	C6 C8 C10 C13 C19	D1 D2 D3 D6 D10

Other comments on the Evaluation

For the announcement of July, will conserve the parts approved, since it presupposes that the competitions, aptitudes and knowledges purchased do not lose .

http://bioloxia.uvigo.es/docs/docencia/examenes/exames_grado_2017-18.pdf

Sources of information

Basic Bibliography

Complementary Bibliography

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- Lagadic, L., Caquet, T., Amiard, J-C, Ramade, F., **Use of biomarkers for Environmental Quality Assessment**, Balkema,
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Recommendations
