UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				**2022/23**
Subject (*)	ENXEÑARÍA MEDIOAMBIENTAL		**Code**	730G04017
Study programme	Grao en Enxeñaría en Tecnoloxías Industriais			
Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Graduate	1st four-month period	Second	Obligatory	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Naval e IndustrialQuímica			
Coordinador	Filgueira Vizoso, Almudena	**E-mail**	almudena.filgueira.vizoso@udc.es	
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Web	https://campusvirtual.udc.gal/login/index.php			
General description	This subject aims to develop skills that allow students to know and identify the problem of air, water and soil pollution. Control of atmospheric pollution, liquid discharge treatments: ARU and ARI. and RSU and RSI treatment systems. The legal and environmental management aspects in the company will allow its application in the labor world.			

Study programme competences	
Code	**Study programme competences**
A16	CR10 Coñecementos básicos e aplicación de tecnoloxías ambientais e sustentabilidade.
B2	CB2 Que os estudantes saiban aplicar os seus coñecementos ao seu traballo ou vocación dunha forma profesional e posúan as competencias que adoitan demostrarse por medio da elaboración e defensa de argumentos e a resolución de problemas dentro da súa área de estudo
B3	CB3 Que os estudantes teñan a capacidade de reunir e interpretar datos relevantes (normalmente dentro da súa área de estudo) para emitiren xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética
B5	CB5 Que os estudantes desenvolvan aquelas habilidades de aprendizaxe necesarias para emprenderen estudos posteriores cun alto grao de autonomía
B6	B3 Ser capaz de concibir, deseñar ou poñer en práctica e adoptar un proceso substancial de investigación con rigor científico para resolver calquera problema formulado, así como de comunicar as súas conclusións ?e os coñecementos e razóns últimas que as sustentan? a un público tanto especializados como leigo dun xeito claro e sen ambigüidades
B7	B5 Ser capaz de realizar unha análise crítica, avaliación e síntese de ideas novas e complexas
B8	B7 Deseñar e realizar investigacións en ámbitos novos ou pouco coñecidos, con aplicación de técnicas de investigación (con metodoloxías tanto cuantitativas como cualitativas) en distintos contextos (ámbito público ou privado, con equipos homoxéneos ou multidisciplinares etc.) para identificar problemas e necesidades
C1	C3 Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C2	C4 Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.
C4	C6 Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C6	C8 Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes	
Learning outcomes	**Study programme competences**

Coñecer de forma básica a aplicación de tecnoloxías medioambientais	A16	B2	C1
		B3	C2
		B5	C4
		B6	C6
		B7	
		B8	
Coñecer de forma básica a aplicación de sostenibilidade	A16	B2	C4
		B3	C6
		B7	

Contents	
Topic	**Sub-topic**
The following topics develop the contents established in the verification report card, which are:	Waste, water and atmosphere Contamination Management of environmental problems in the company
1. WASTE: Urban Waste	1.1. Introduction and definitions 1.2. Composition of urban waste 1.3. Treatment and elimination of urban waste: Incinerators with energy recovery and Recycling and Composting Centers 1.4. Landfills 1.5. Applicable Environmental Legislation: Local, autonomous, state and European
2. WASTE: Industrial Waste	2.1. Industrial waste categories: According to the activity that generates them, Second its danger. 2.2. Hazardous waste classification: READ 2.3. Industrial waste treatments: Minimization, reuse and recycling in industry. 2.4. Other applied treatments: Physical processes; Neutralization; Inertization: encapsulation, solidification; Physical-chemical treatments: ion exchange; Thermal treatments: Pyrolysis, Plasma, Catalytic incineration and Incineration under special conditions. 2.5. Applicable Environmental Legislation: Local, autonomous, state and European (equipment)
3. ATMOSPHERIC POLLUTION	3.1. Meteorology of air pollution 3.2. Atmosphere composition 3.3. Troposphere Chemistry. Air pollutants 3.4. Control of industrial emissions to air (equipment)
4. RESIDUAL WATER: Introduction and types of residual water	4.1. Contaminants and physical, chemical and biological parameters 4.2. Objectives of the characterization of a residual water. Wastewater characterization parameters. Sampling: Point compound and continuous
5. RESIDUAL WATER: Treatments in a EDAR	5.1. What is a EDAR?. 5.2. Pretreatment: roughing and grinding. Objectives and design parameters 5.3. 1st treatment 5.4. Improvement processes: Coagulation and flocculation. Design parameters 5.5. 2nd treatment. 5.6. Natural water purification treatments: Land application treatments. Lagoons and filters of superficial and subsurface flow. 5.7. Treatment 3º. 5.8. Applicable Environmental Legislation: Local, autonomous, state and European

6. MANAGEMENT OF ENVIRONMENTAL PROBLEMS IN THE COMPANY	6.1. Environmental risks in the company
	6.2. Accidental and gradual contamination
	6.3. Analysis of the life cycle of a product (LCA)
	6.4. Environmental management systems: ISO 14000.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A16 B5 B6 C1	33	33	66
Supervised projects	B3 B7 C2 C4	9	15	24
Laboratory practice	B8 C6	10	15	25
Mixed objective/subjective test	B2 B3	0	10	10
Problem solving	B2 B3 B7	7	7	14
ICT practicals	A16 B3 B7 C1 C4	1	4	5
Field trip	B2 C6	2.5	2.5	5
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Oral presentation complemented by the use of audiovisual media and the introduction of some questions aimed at students, in order to transmit knowledge and facilitate learning. The master class is also known as a lecture, expository method or Lecture. This last modality is usually reserved for a special type of lesson given by a teacher on special occasions, with content that implies an original elaboration based on the almost exclusive use of the word as a way of transmitting information to the audience.
Supervised projects	Methodology designed to promote the autonomous learning of students, under the tutelage of teachers and in varied settings (academic and professional). It is primarily concerned with learning how to do things. It is an option based on the assumption by students of responsibility for their own learning. This teaching system is based on two basic elements: independent student learning and monitoring of that learning by the tutor.
Laboratory practice	Methodology that allows students to learn effectively through practical activities, such as demonstrations, exercises, experiments and research
Mixed objective/subjective test	Exam that integrates standard questions and objective type questions. As for the former, it includes open-ended questions of development, the latter can combine multiple-choice, ranking, short-answer, discrimination, completion and association questions.
Problem solving	Technique through which a specific problem situation has to be solved, based on the knowledge that has been worked on, which may have more than one possible solution
ICT practicals	Methodology that allows the student to learn effectively, through activities of a practical (demonstrations, simulations, etc.) the theory of a field of knowledge, through the use of information and communication technologies. ICTs are an excellent support and channel for the processing of information and the practical application of knowledge, facilitating learning and the development of skills by students.
Field trip	Activities developed in a context external to the university academic environment (companies, institutions, organizations, monuments, etc.) related to the field of study of the subject. These activities focus on the development of skills related to direct and systematic observation, information gathering, product development (sketches, designs ...)

Personalized attention	
Methodologies	Description

Mixed objective/subjective test	Tutored jobs: recommend yourself to attend personalized tutorials. The students will receive guidance on how to start and perform or work according to the criteria specified below.
Problem solving	Oral presentation: made with the support of slides or material that they consider to be available to each group of students, there will be an established tempo for this.
Field trip	
Supervised projects	
Laboratory practice	Laboratory practices: the student will be previously citted through the Virtual Campus. The practices will be carried out in the Chemical Technology and Environment Laboratory of the Technological Workshops Building unless otherwise indicated.
Guest lecture / keynote speech	
ICT practicals	In case of academic exemption, or if the student is in contact with the teachers of the subject to agree on the dates to carry out the activities planned in the subject, always within the possibilities allowed by timetables.

Assessment

Methodologies	Competencies	Description	Qualification
Mixed objective/subjective test	B2 B3	Exame	70
Supervised projects	B3 B7 C2 C4	A amplitude do guión As fontes consultadas A exposición oral	25
Laboratory practice	B8 C6	Realización de prácticas Elaboración manual	5
Others			

Assessment comments

Students with a calification higher than 4 in the objective tests will go on to weighing with the rest of the evaluation methodologies.
In the event that any of the activities mentioned above were not carried out, the qualification of that methodology will pass to the objective test.
In the first evaluation opportunity, both the qualification of the works and the laboratory practices will be taken into account, as long as they pass the minimum of 4 in the mixed test. This same criterion will be applicable for the second opportunity.
For the advanced call, the laboratory practices and the mixed test will be taken into account, therefore the latter having a value of 95% of the note and 5% the laboratory practices.
Attendance at laboratory practices is mandatory to pass the course. The student who presents proof of not attending the practice as must take an exam of the same as the day of the exam of the January call or, failing that, the day of the second opportunity exam.
The fraudulent performance of the tests or evaluation activities will directly imply the grade of failure a "0" in the matter in the corresponding call, thus invalidating any grade obtained in all the evaluation activities for the extraordinary call.

Sources of information

Basic	- Ramalho, R.S (1991). Tratamiento de aguas residuales. Reverte
	- Mackenzie L. Davis/ Susan J. Masten (2004). Ingeniería y Ciencias Ambientales. México. McGraw Hill
	- Metcalf-Eddy (1985). Ingeniería Sanitaria. Tratamiento, evacuación y eliminación de aguas residuales. Labor
	- Hernández Muñoz, Aurelio (1998). Depuración de aguas residuales. Madrid. Servicio publicaciones EIC
	- Romero González, Eladio M (2015). Evaluación y gestión medioambiental para planes, programas y proyectos de ingeniería. Universidad de Sevilla
	- Martínez Ataz, Ernesto; Díaz de Mera Morales, Yolanda (2004). Contaminación atmosférica. Ediciones de la Universidad de Castilla-La Mancha
Complementary	- C. Orozco;A.Pérez; Mª N. González (). Contaminación Ambiental. Una visión desde la Química. Thomson
	- Woodside, Gayle. Patrick Aurrichio (2001). Auditoría de sistemas de gestión medioambiental : ISO 14001. Madrid. McGraw-Hill,
	- Bautista,C - Rodríguez Vidal, Francisco (2003). Procesos de potabilización del agua e influencia del tratamiento de ozonización. Madrid. Diaz de Santos
	- Robert A. Corbitt (2003). Manual de referencia de la Ingeniería Ambiental. McGraw Hill
	- Kiely, Gerard. (1999). Ingeniería ambiental : fundamentos, entornos, tecnologí.as y sistemas de gestión. McGraw-Hill
	- E.T.S. de Ingenieros Industriales e Ingenieros informáticos (2000). Residuos industriales y suelos contaminados.
	- Simona Pecoraio (2015). Gestión de residuos industriales. Cano Pina S.L.

Recommendations
Subjects that it is recommended to have taken before
Chemistry/730G03005
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
1. The delivery of the documentary works carried out in this matter:1.1. It will be requested in virtual format and / or computer support.1.2. It will be done through Moodle or similar, in digital format without the need to print them1.3. If done on paper:-No plastics will be used.- Double-sided prints will be made.- Recycled paper will be used.- Draft printing will be avoided.2.- A sustainable use of resources and the prevention of negative impacts on the natural environment must be made.3.- The importance of ethical principles related to the values of sustainability in personal and professional behavior must be taken into account.4.- As stated in the different regulations of application for university teaching, the gender perspective must be incorporated in this matter (non-sexist language will be used, bibliography of authors of both sexes will be used, intervention in class of students will be encouraged and students ...).5.- Work will be done to identify and modify prejudices and sexist attitudes, and the environment will be influenced to modify them and promote values of respect and equality.6. Situations of discrimination based on gender must be detected and actions and measures will be proposed to correct them.7. The full integration of students who for physical, sensorial, psychic or sociocultural reasons, experience difficulties to adequate, equal and beneficial access to university life will be facilitated