UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2015/16
Subject (*)	Tecnoloxía Química		Code	610G01041
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optativa	4.5
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Química Física e Enxeñaría Química 1			
Coordinador	Veiga Barbazan, Maria del Carmen	E-mail	m.carmen.veiga@udc.es	
Lecturers	Ruiz Bolaños, Isabel Veiga Barbazan, Maria del Carmen	E-mail	isabel.ruiz@udc.es m.carmen.veiga@udc.es	
Web				
General description	The subject ?Chemical Technology? is an elective course offered in the last year of the degree in Chemistry. The main objective of the course is to provide the students with basic knowledge of environmental engineering. It introduces the most important processes used in water treatment and recovery, waste gas treatment and waste treatment and disposal.			

Study programme competences / results	
Code	Study programme competences / results
A7	Knowledge and application of analytical methods
A10	Knowledge of chemical kinetics, catalysis and reaction mechanisms
A11	Knowledge and design of unit operations in chemical engineering
A13	Understanding of chemistry of main biological processes
A14	Ability to demonstrate knowledge and understanding of concepts, principles and theories in chemistry
A15	Ability to recognise and analyse new problems and develop solution strategies
A16	Ability to source, assess and apply technical bibliographical information and data relating to chemistry
A19	Ability to follow standard procedures and handle scientific equipment
A20	Ability to interpret data resulting from laboratory observation and measurement
A21	Understanding of qualitative and quantitative aspects of chemical problems
A22	Ability to plan, design and develop projects and experiments
A24	Ability to explain chemical processes and phenomena clearly and simply
A25	Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life
A28	Acquisition, assessment and application of basic principles of industrial activity, organisation and task management
B1	Learning to learn
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
B5	Teamwork and collaboration
B6	Ethical, responsible, civic-minded professionalism
B7	Effective workplace communication
C2	Oral and written proficiency in a foreign language
C5	Understanding importance of entrepreneurship, and knowledge of resources available for people with business ideas
C6	Ability to assess critically the knowledge, technology and information available for problem solving
C8	Understanding role of research, innovation and technology in socio-economic and cultural development

Learning outcomes

Learning outcomes	Study programme competences / results		
To understand the design and operation of chemical and biological reactors.	A10 A11 A24 A28	B3 B7	C2
To know the problems of water and air pollution and waste management, and also the technologies available to treat it.	A7 A13 A14 A15 A16 A19 A20 A21 A22 A24 A25 A28	B1 B2 B3 B4 B5 B6 B7	C2 C5 C6 C8

Contents	
Topic	Sub-topic
Chapter 1. Introduction to environmental engineering.	Separation operations. Types of reactors and bioreactors.
Chapter 2. Wastewater treatment.	Introduction. Physical treatment processes. Biological treatment processes and technologies.
Chapter 3. Treatment of gaseous effluents.	Introduction. Systems for pollution abatement. Treatment technologies to treat contaminated gases and vapors.
Chapter 4. Waste valorisation and treatment.	Introduction. Types of Waste. Waste valorization and management. Waste treatment technologies.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A10 A11 A13	15	30	45
Seminar	A14 A15 A16 A24 A25 B1 B2 B3 B4 B5 C6	7	21	28
Laboratory practice	A7 A19 A20 A21 A22 B3 B4 B5 B7	7	7	14
Field trip	A21 A24 A25 A28 B6 C5	3	3	6
Supervised projects	A14 A15 A24 A25 B3 B4 B5 B7 C2 C8	3	13.5	16.5
Mixed objective/subjective test	A10 A11 A13 A14 A16 A24 B1 B2 C6	2	0	2
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	Lectures with the basic content of the subject.
Seminar	Practical problems related to the given lectures will be developed.
Laboratory practice	Laboratory experiments to apply the adquired theoretical knowledge to practice. Acquisition of the basic skills and procedures related to the subject under study.
Field trip	Several training visits to companies that have facilities related to the contents of the subject will be done. Each individual student should prepare a report to be delivered to the teacher. It is a mandatory activity.
Supervised projects	Homework to be prepared in a small group of students on a topic related to the subject content. It will have a submission deadline. A written report will be given to the teacher and will be presented orally in class.
Mixed objective/subjective test	A final written exam to assess the knowledge acquired by the student will be held at the end of the semester.

Personalized attention	
Methodologies	**Description**
Supervised projects	The teacher will help the student with the doubts that may arise in performing the activities entrusted to it. It will take place in the timetable of tutorials available to the teacher.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Supervised projects	A14 A15 A24 A25 B3 B4 B5 B7 C2 C8	They quality of the report will be assessed in terms of content and references. Both the submitted written report and oral presentation will contribute to the assessment.	15
Laboratory practice	A7 A19 A20 A21 A22 B3 B4 B5 B7	A continuous assesment in the experimental work. The report with the results and discussion will be assessed.	15
Mixed objective/subjective test	A10 A11 A13 A14 A16 A24 B1 B2 C6	Final written exam that will assess the knowledge acquired at the end of the semester.	65
Field trip	A21 A24 A25 A28 B6 C5	Each student should prepare a report on the facilities visited in the company, and deliver it to the teacher. It is a mandatory activity.	5

Assessment comments

- Attendance to all the laboratory and field trip activities is mandatory. At least, a grade of 4 (out of 10) in each of these activities is required. If the average is equal to or greater than 5 (out of 10) but this threshold marks was not met, the final mark will be 4.5 (fail).

- According to the rules contained in ?Probas de Avaliación e Actas de Cualificación de Grao e Mestrado?, the so-called ?second opportunity of July? is understood as a second opportunity to take the final written exam. The score of this second exam will be considered together with the others obtained during the course, corresponding to the other activities. The percentages of the different contributions will be the same as those of the former "first opportunity".

- Students who have not atended the mixed objective test and have not participated in no more than 25% of the scheduled sctivities will be graded as non attendance.
- Mark Honors: priority is given in the first opportunity (June). Honors may only be granted in July if their number have not be exhausted in June final qualifications.

- The teaching-learning process, including assessment, refers to an academic course and, therefore, will restart as new with every new academic year, including all activities and assessment procedures scheduled for that course.

Sources of information	
Basic	Henley EJ y Seader JD. Operaciones de separación por etapas de equilibrio en ingeniería química. Ed. Reverté, Barcelona (1988). Ramalho, R. S. Tratamiento de aguas residuales. Ed. Reverté. Barcelona (1996). Metcalf and Eddy. Ingeniería de Aguas Residuales. Tratamiento, vertido y reutilización. Labor. Barcelona (1995). Henze, M., van Loosdrecht, M. C. M., Ekama, G.A. and Brdjanovic, D.. Biological Wastewater Treatment. IWA Publishing (2008). APHA, Standard Methods for the Examination of Water and Wastewater. 20th ed., Washington DC, USA. (1998). Kennes, C. and Veiga, M.C. Bioreactors for waste gas treatment. Kluwer Academic Publishers (2001). Deublein, D. and Steinhauser, A. Biogas from waste and renewable resources: an introduction. Wiley-VCH, (2008). Anderson, W.C. Innovative site remediation technology (Vol 1-8), American Academy of Environmental Engineers, (1993).
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Enxeñaría Química/610G01033
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
We suggest that students are able to understand English texts.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.