Teaching Guide				
Identifying Data				2017/18
Subject (*)	Chemical Technology		Code	610G01041
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optativa	4.5
Language	Galician			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Ruiz Bolaños, Isabel	E-mail	isabel.ruiz@udc.es	
Lecturers	Ruiz Bolaños, Isabel	E-mail	isabel.ruiz@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	
Code	Study programme competences
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

To understand the design and operation of chemical and biological reactors.	A10 A11 A15 A24 A28	B3 B7	
To know the problems of water and air pollution and waste management, and also the technologies available to treat it.	A7 A13 A14 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**	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A10 A11 A13 A15 A21 A25 A28	16	40	56
Supervised projects	A10 A11 A14 A16 A21 A22 A24 A25 A28 B1 B3 B4 B5 B6 B7 C2 C5 C6 C8	6.5	26	32.5
Laboratory practice	A7 A14 A15 A19 A20 A21 B3 B4 B5 B7	9	9	18
Mixed objective/subjective test	A13 A14 A16 A24 B2 B3 B7 C6	2	3	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	Lectures with the basic content of the subject.
Supervised projects	The work will be prepared individually or in a small group of students on a topic related to the subject content. A written report will be given to the teacher and will be presented orally in class.

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.
Mixed objective/subjective test	A final written exam to assess the knowledge acquired by the student will be held at the end of the course.

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 available to the teacher. In the case of justified exceptional circumstances, additional measures may be taken so that the student can pass the subject, such as flexibility in the delivery date of supervised projects and in practice schedules.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Supervised projects	A10 A11 A14 A16 A21 A22 A24 A25 A28 B1 B3 B4 B5 B6 B7 C2 C5 C6 C8	Students must to do a work related with the contents of the subject. In the evaluation of the works it will assess the quality of the report as well as their oral presentation.	25
Laboratory practice	A7 A14 A15 A19 A20 A21 B3 B4 B5 B7	Attendance to all of the laboratory activities is mandatory. In the evaluation of the lab work it will take account the attitude in the lab and the quality of the results and conclusions report.	10
Mixed objective/subjective test	A13 A14 A16 A24 B2 B3 B7 C6	Students must to do a final written exam that will assess the knowledge acquired.	65

Assessment comments

To pass the subject, it is required at least a score of 4 (out of 10) in each of the assessment activities, and a global average score equal to or greater than 5 (out of 10). Even if the global grade is equal or greater than 5, if a student does not get the minimum score in any of the activities, the final mark will be 4,5 (fail). In the second opportunity (July) only it's possible to improve the score in the exam. The scores in the other activities will be the same than in the first opportunity. Only the students who did not do any of the assessment activities will be considered as "not presented". Honor marks will be given priority in the first opportunity (June), in the second opportunity (July) they may only be granted if have not been exhausted in June. The teaching-learning process, including assessment, refers to an academic course and, therefore, will restart as new with every academic year, including all activities and assessment procedures scheduled for that course. In the case of justified exceptional circumstances, additional measures may be taken so that the student can pass the subject, such as flexibility in the delivery date of supervised projects and in practice schedules.

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
Chemical Engineering/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.