Teaching Guide				
Identifying Data				2018/19
Subject (*)	Design, Elaboration and Management of Chemistry Projects		Code	610G01036
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Obligatory	6
Language	Galician			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Ligero Martínez - Risco, Pablo	E-mail	pablo.ligero@udc.es	
Lecturers	Ligero Martínez - Risco, Pablo Vega Martin, Alberto de	E-mail	pablo.ligero@udc.es alberto.de.vega@udc.es	
Web	campusvirtual.udc.es/moodle			
General description	A materia se inscribe dentro do segundo cuadrimestre do ultimo curso do grao de química. O obxectivo da mesma é dobre, por unha banda, pretendese que o alumnado teña coñecemento de tódolos pasos que leva á elaboración dun proxecto e, por outra, procurarase que o alumnado traslade eses coñecementos ó eido da química mediante a planificación e desenvolvemento dun proxecto de química dende un punto de vista técnico-económico-social.			

Study programme competences / results	
Code	Study programme competences / results
A1	Ability to use chemistry terminology, nomenclature, conventions and units
A5	Understanding of principles of thermodynamics and its applications in chemistry
A11	Knowledge and design of unit operations in chemical engineering
A15	Ability to recognise and analyse new problems and develop solution strategies
A22	Ability to plan, design and develop projects and experiments
A28	Acquisition, assessment and application of basic principles of industrial activity, organisation and task management
B2	Effective problem solving
B4	Working independently on own initiative
B5	Teamwork and collaboration
B7	Effective workplace communication
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)
C3	Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life
C4	Self-development as an open, educated, critical, engaged, democratic, socially responsible citizen, equipped to analyse reality, diagnose problems, and formulate and implement informed solutions for the common good

Learning outcomes			
Learning outcomes	Study programme competences / results		
To have ability to plan and design in chemical projects	A5 A11 A15 A22 A28	B2 B4 B5 B7	C1 C3
To have theoretical knowledge in industrial chemical process	A11 A22		C1

To have ability to work in teams.	A22	B2 B5 B7	C1 C3
Prepare and write scientific report	A1 A28		
Ability to investigate and implement knowledge-based and oriented to the common good solutions.	A22	B5	C4

Contents	
Topic	**Sub-topic**
1. BASIC CONCEPTS OF PROJECT	1.1. Project definición and general characteristics 1.2. Project theory: Definition and classification 1.3. Project characteristics and stages 1.4. Project lifecycle 1.5. Project management
2. FEASIBILITY STUDIES: ECONOMIC FEASIBILITY	2 Economic feasibility estudies 2.1. Market research 2.2. Demand and supply 2.3. Market mechanism 2.4. Demand elasticities : Definition and types 2.5. Price estimation and income
3. FEASIBILITY STUDIES: INDUSTRIAL LOCATION AND CAPACITY-SIZE OF THE PLANT	3.1 Location of plant 3.1.1 Factors of industrial location 3.2.2. Estimate methods 3.2. Capacity-size plant estimation 3.2.1. Economy of scale 3.2.2. Capacity-size estimation methods
4. FEASIBILITY ESTUDIES: TYPES AND ESTIMACIÓN OF COSTS	4.1. Production. The prodution/cost ratio 4.2. Costs: descripción, types and cost estimate
5. FEASIBILITY STUDIES: ESTIMATE OF INVESTMENT	5.1. Type of capital 5.2. Estimate of fixed assets 5.3. Estimate working capital
6. FEASIBILITY STUDIES: ECONOMIC EVALUATION OF PROJECT	6.1. Economic evaluation of project: Description 6.2. Static analysis of economic evaluation of project 6.3. Dinamic analysis of economic of evaluation of project
7. DETAILED ENGINEERING	7.1. Design basic engineering 7.2. Proyect esqueme and description 7.3. Basic engineering specificaions. 7.4. Equipment design.
8. ENERGY BALANCE: APPROACH AND APPLICATIONS.	8.1.Energy balance approach. Conservation equation. 8.2. Balance equation. Simplified way of the equation. 8.2.1. Heat exchange balance. 8.2.1.1. Heating exchanger. 8.2.1.2. Evaporator. 8.2.2. Fluids mechanics balance. 8.2.2.1. Determination of pump power.

9. PLANNING & PROGRAMMING.	9.1. Time on project. 9.2. Planning and programming. 9.2.1. Programming steps. 9.3. Programming 9.3.1. Gantt diagram. 9.3.2. PERT/CPM 9.5. Safety on project.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A5 A28	26	52	78
Seminar	A15 A11 B2 B4 B7	9	18	27
Supervised projects	A22 A28 B4 B5 C1 C3 C4	10	30	40
Mixed objective/subjective test	A1 A5 A15 B4 B2 C1	3	0	3
Personalized attention		2	0	2
(*)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	Guest lecture will be taught in whole group. At the beginning, the objectives of the subject matter will be presented. Likewise, at the end of each topic will be present a summary. The students will be provided teaching materials in advance.
Seminar	This methodology aims to go in deep some specific aspects of the subject treated more generally in the theory classes. For this, we will work on practical work related to project development and process units.
Supervised projects	Supervised projects intend that students to do a small project/study in small groups. At the end of course the students must hand the study and defense after oral presentation. In these sesions teacher will help students with any questions.
Mixed objective/subjective test	At the end of the course, students must pass a mixed objective test, which which will consist of a practical test.

Personalized attention	
Methodologies	Description
Seminar Supervised projects	In the seminars, personalized attention will be through face tutorials. Students with appreciation a part-time academic and attendance waiver of exemption may complete the work tutored in custom and / or group tutoring schedule to be agreed with the teachers. The activities undertaken in these tutorials will be similar to those of students in ordinary regime and consideration for the final assessment with 20% of the grade global. In the seminars personalized attention will be done by face and by electronic means tutoring . At the individual level the student may submit questions concerning practical issues raised in class . At the individual level the student may submit questions concerning practical issues raised in the class. In supervised work , personal attention seek to resolve the difficulties posed to the students in the formulation of the project, the choice of tools and analysis of information and the results achieved, and the revision of successive work drafts of the report . In addition to the follow-up work in group tutoring sessions , there will be an individual tutoring schedule established by teachers.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Seminar	A15 A11 B2 B4 B7	During the week some exercices will be provided to students to solve which should be turned over to teacher before correcting in the seminar sesion. Other times, teacher will provide some exercices to students for solving in the seminar sesion. The handed exercises will be scored up 20%, proportional way, of total score.	0
Mixed objective/subjective test	A1 A5 A15 B4 B2 C1	At the end of the course a test will be done, that will inclued a practical issues. This test is obligatory being scored from 1 to 10 points, proportionally. To compute the final grade will need to have at least four points in it.	70
Supervised projects	A22 A28 B4 B5 C1 C3 C4	During course students will do a project/study in small groups, which have to hand in writing way. The clarity of content, presentation and writing will be assessed. The process of preparing the work will also be evaluated with special attention to the capacity of group work and individual initiative. The project is obligatory in the fixed time. Is not possible to pass the course without doing and handing the project.	30

Assessment comments
The test will include a practical issues. The test score will add to score of the other activities.To pass the course at least 5 points will be required in the test, do and turn over project and get 5 points in the final mark. If the minimum score is not reached and/or the project is not hand, moreover the sum of final mark is 5 points, or more, the matter appear as failing grade (4,5). Students who don´t appear more than 20% of avaliable activities will consider like "not attend". The score of seminar and supervised project in the second opportunity will keep while the test score of the second opportunity will replace the score of first opportunity test. Students in second opportunity cannot reach maximum score if was reached in first opportunity. The next course will begin like new one course in all activities.

Sources of information	
Basic	- Institut Cerdá (1994). Manual de minimización de residuos y emisiones industriales. Institut Cerdá, Barcelona - Cabra Dueñas, L., de Lucas Martínez, A., Ruiz Fernández, F. e Ramos Marcos, M.J. (2010). Metodología del diseño aplicado y gestión de proyectos para ingenieros quiímicos. Ediciones de la Universidad de Castilla-La Mancha - Canon, J.L. , Rebollar, R. e Saenz, M.J. (2003). Curso de gestión de proyectos. Manual del alumn. Asociación Española de Ingeniería de Proyectos (AEIP) - Corchuelo, B., Eguía, B. y Valor, M.T. (2006). Curso práctico de microeconomía. Delta publicaciones - Cepeda, I.; Lacalle, M.; Simón, J.R.; Romero, D. (2004). Economía para ingenieros. Thomson editores - Cos Castillo, M. de (1997). Teoría General del Proyecto. Volumen I: Dirección de Proyectos. Editorial Síntesis - Sapag Chain, N. y Sapag Chain, R. (2000). Preparación y Evaluación de Proyectos. Editorial McGraw-Hil - Storch de Gracia, J. N. y García Martín, T. (2008). Seguridad Industrial en Plantas Químicas y Energéticas. Editorial Díaz de Santos - Levenspiel, O. (1993). Flujo de fluidos e intercambio de calor . Editorial Reverté - Costa Novella, E. (1988). Ingeniería Química- Flujo de fluidos. Editorial Alhambra - Izquierdo, J.F.,; Costa, J.; Martínez de la Ossa, E.; Rodríguez, J. y Izquierdo, M. (2015). Introducción a la Ingeniería Química. Problemas resueltos de balances de materia y energía. Editorial Reverté
Complementary	- Corchuelo, B., Eguía, B. y Valor, M.T. (2006). Curso práctico de microeconomía. Delta Publicaciones - Vian, A. (1991). El Pronóstico Económico en Química Industrial. Editorial Eudema - Peters, M. S., Timmerhaus, K. D. y West, R. E. (2012). Plant Design and Economics for Chemical Engineers. Editorial McGraw-Hill - Sinnott, R. & Towler, G. (2012). Diseño en Ingeniería Química. Editorial Reverté

Recommendations
Subjects that it is recommended to have taken before
Mathematics 1/610G01001 Mathematics 2/610G01002 Physics 1/610G01003 Physics 2/610G01004 General Chemistry 1/610G01007 General Chemistry 2/610G01008 General Chemistry 3/610G01009 Chemistry Laboratory 1/610G01010 Chemistry Laboratory 2/610G01032 Chemical Engineering/610G01033
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(*)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.