



| Teaching Guide | | | | |
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| 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, procurárase 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 | |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code | Study programme competences |
| 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 | | |
| 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 |



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|-------------------------------------------------------------------------------------------------|-----|----|----|
| 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 studies 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 production/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 especificaions. 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. |



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| 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. |
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| Planning | | | | |
|---------------------------------|---------------------------|----------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies | Ordinary class hours | 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 sessions 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 | <p>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.</p> <p>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 .</p> <p>At the individual level the student may submit questions concerning practical issues raised in the class.</p> <p>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.</p> |



Assessment

| Methodologies | Competencies | Description | Qualification |
|---------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Seminar | A15 A11 B2 B4 B7 | During the week some exercises will be provided to students to solve which should be turned over to teacher before correcting in the seminar session. Other times, teacher will provide some exercises to students for solving in the seminar session. 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 include 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 available 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

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| Basic | <ul style="list-style-type: none"> - 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 químicos. 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-Hill - 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 | <ul style="list-style-type: none"> - 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 |
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| 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 |
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| Subjects that continue the syllabus |
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| Other comments |
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(*)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.