



Teaching Guide				
Identifying Data				2013/14
Subject (*)	Química Orgánica 2	Code	610G01027	
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatoria	6
Language	SpanishEnglish			
Prerequisites				
Department	Química Fundamental			
Coordinador	Perez Sestelo, Jose	E-mail	jose.perez.sestelo@udc.es	
Lecturers	García Romero, Marcos Daniel Maestro Saavedra, Miguel Anxo Ojea Cao, Vicente Perez Sestelo, Jose Ruiz Pita-Romero, Maria	E-mail	marcos.garcia1@udc.es miguel.maestro@udc.es vicente.ojea@udc.es jose.perez.sestelo@udc.es maria.ruiz.pita-romero@udc.es	
Web				
General description	A materia Química Orgánica 2 é unha continuación na ensinanza da Química Organica impartida en Química Orgánica 1. Nesta materia continuase o estudio da estrutura e reactividade dos compostos orgánicos clasificados por grupos funcionais.			

Study programme competences	
Code	Study programme competences
A1	Utilizar a terminoloxía química, nomenclatura, convenios e unidades.
A4	Coñecer os tipos principais de reacción química e as súas principais características asociadas.
A9	Coñecer os rasgos estruturais dos compostos químicos, incluíndo a estereoquímica, así como as principais técnicas de investigación estrutural.
A10	Coñecer a cinética do cambio químico, incluíndo a catálise e os mecanismos de reacción.
A12	Relacionar as propiedades macroscópicas coas de átomos e moléculas.
A13	Comprender a Química dos principais procesos biolóxicos.
A14	Demostrar o coñecemento e comprensión de conceptos, principios e teorías relacionadas coa Química.
A15	Recoñecer e analizar novos problemas e planear estratexias para solucionarlos.
A17	Traballar no laboratorio Químico con seguridade (manexo de materiais e eliminación de residuos).
A19	Levar a cabo procedementos estándares e manexar a instrumentación científica.
A20	Interpretar os datos procedentes de observacións e medidas no laboratorio.
A21	Comprender os aspectos cualitativos e cuantitativos dos problemas químicos.
A22	Planificar, deseñar e desenvolver proxectos e experimentos.
A23	Desenvolver unha actitude crítica de perfeccionamento na labor experimental.
A24	Explicar, de xeito comprensible, fenómenos e procesos relacionados coa Química.
A25	Relacionar a Química con outras disciplinas e recoñecer e valorar os procesos químicos na vida diaria.
A26	Levar a cabo procedementos estándares de laboratorios implicados en traballos analíticos e sintéticos, en relación con sistemas orgánicos e inorgánicos.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B5	Traballar de forma colaborativa.
B7	Comunicarse de maneira efectiva nun entorno de traballo.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.

C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.
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Learning outcomes			
Subject competencies (Learning outcomes)	Study programme competences		
Recognize and use the terminology of organic chemistry including nomenclature, rules and units.	A1	B1 B4 B7	C1 C6 C7
Know the main organic reactions, mechanisms, features and stereochemical outcome.	A4 A9 A10 A24 A25	B2 B3	C1 C8
Study the main procedures to synthesize organic compounds organized by functional groups.	A17 A21 A22 A23 A26		C1 C8
Know the most important methods for structural determination of organic compounds (NMR, MS, IR, UV)	A1 A9 A15	B2 B3 B5	
Knowing the structure, properties and chemical reactivity of natural organic compounds	A1 A4 A13 A24		C1 C8
Design, planning and strategy development in the synthesis of organic molecules	A17 A19 A20 A21 A22 A23 A25 A26	B2 B3	C1 C8
Ability to understand the phenomena and processes related to the structure, reactivity and synthesis of organic compounds in biological systems and industrial processes	A10 A12 A13 A14 A22	B3	C1 C7 C8

Contents	
Topic	Sub-topic
Chapter 1. Alkenes and alkynes.	Alkenes: nomenclature, structure and properties. Reactivity: Catalytic hydrogenation. Electrophilic addition reactions. Addition of hydrogen halides, halogens, water, oxymercuration, formation of halohydrins, addition of carbenes and hydroboration. Alkene epoxidation and hydroxylation. Oxidative cleavage of alkenes. Radical additions. Polymerization. Alkynes: nomenclature, structure and physical properties. Acid-base properties. Methods for synthesis. Reductions and electrophilic addition reactions.



Chapter 2. Conjugation, Benzene and Aromaticity	Allylic systems. Dienes. Electrophilic addition reactions: kinetic and thermodynamic control. Diels-Alder reaction. Hückel rule. Electrophilic aromatic substitution. Guidance in SEAr. Phenols: SEAr, Cope-Claisen and oxidation. Aromatic halides: SNAr
Chapter 3. Amines	Nomenclature, structure and acid-base properties. Amine synthesis. Hoffman elimination. Oxidation: Cope elimination. Nitrosation. Aromatic diazonium salts. Sandmeyer reaction and diazoic coupling.
Chapter 4. Aldehydes and ketones	Nomenclature, structure and properties. Nucleophilic addition reaction: hydration, cyanohydrins, hemiacetals and ketals. The Wittig reaction. Imine and enamine formation. Reduction and oxidation reactions. Synthesis of aldehydes and ketones.
Chapter 5. Carboxylic acids and derivatives,	Nomenclature, structure and properties. Acid-base properties. Addition-removing the carboxyl group: mechanism. Condensation with alcohols: Fisher esterification. Esterification with diazomethane. Acid chlorides: synthesis and reactivity. Synthesis of amides. Reduction of carboxylic acids. Structure and physical properties of the derivatives of carboxylic acids. Interconversion between carboxylic acid derivatives. Transesterification. Hydrolysis of the carboxylic acid derivatives. Reduction reactions.

Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Laboratory practice	20	20	40
Guest lecture / keynote speech	17	34	51
Seminar	7	21	28
Workshop	8	18	26
Mixed objective/subjective test	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
Laboratory practice	The student will perform experiments at the laboratory related with the synthesis purification and isolation of organic compounds.
Guest lecture / keynote speech	In this activity, the contents of the subject will be presented by the teacher stimulating the student participation. Students should prepare before classes according to the teacher's instructions.
Seminar	The seminars will be devoted to the resolution and discussion of selected exercises related to the contents of the subject.
Workshop	For the continuing learning, workshops will be organized in small groups. In these sessions key issues and exercises will be discussed. The students will have the opportunity to ask and to clarify doubts.
Mixed objective/subjective test	In order to evaluate the knowledge and skills acquired a written test is programmed at the end of the course. This test will identify issues and questions concerning the contents of the subject.

Personalized attention	
Methodologies	Description
Workshop	Laboratory classes.
Laboratory practice	The lab experiments will be held and monitored individually.
Workshop	This activity will take place in reduced groups. It aims to give the student a personalized service and to detect and clarify the doubts, weaknesses and gaps during the learning of the subject.



Assessment		
Methodologies	Description	Qualification
Workshop	The attendance to the workshops, participation and the exercises done or presented during this activity will be part of the qualification.	15
Laboratory practice	The activities programed in the lab are mandatory to pass the course. Its assessment will be performed taking into account the work preparing the experiments, the experimental work done in the lab, and the laboratory notebook.	15
Mixed objective/subjective test	In order to evaluate the knowledge acquired, a written test is programed at the end of the course.	70

Assessment comments
<p>The lab work is mandatory to pass the course. Overall, each student should obtain in the final exam a mark not less than 40% and get, combining scores of all activities, a minimum of 5 out of 10. Students participating in a number of assessment activities not exceeding 15% may qualify as a No Show (No presentado). The students evaluated on the second occasion can only obtain de highest qualification (Matricula de Honor) if the maximum number has not been fully covered during the first opportunity.</p> <p>The qualification during the lab work, seminars and workshops (30% of the assessment) will be retained in the second opportunity (to be performed in July). Regarding future academic years, the teaching-learning process, including assessment is referred to an unique academic course (qualifications are not saved for future academic years).</p>

Sources of information	
Basic	<ul style="list-style-type: none">- (). .- Jonathan Clayden, Nick Greeves, and Stuart Warren (2012). Organic Chemistry. Oxford University Press- L.G. Wade, Jr (2013). Organic Chemistry. Prentice Hall- K.P.C. Vollhardt and N.E.Schore (2011). Organic Chemistry: structure and function. W H Freeman- L.G. Wade, Jr (2004). Química Orgánica. Pearson- K.P.C. Vollhardt and N.E.Schore (2007). Química Orgánica: estructura y función. Omega
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Ampliación de Química Orgánica/610G01028 Experimentación en Química Orgánica/610G01029
Subjects that are recommended to be taken simultaneously
Laboratorio de Química/610G01032
Subjects that continue the syllabus
Química 3/610G01009 Química 4/610G01010 Química Orgánica 1/610G01026
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.