



Teaching Guide				
Identifying Data			2016/17	
Subject (*)	Química Orgánica 1		Code	610G01026
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Second	Obligatoria	6
Language	SpanishEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química Fundamental			
Coordinador	Peinador Veira, Carlos	E-mail	carlos.peinador@udc.es	
Lecturers	García Romero, Marcos Daniel Ojea Cao, Vicente Peinador Veira, Carlos Rodriguez Gonzalez, Jaime Ruiz Pita-Romero, Maria	E-mail	marcos.garcia1@udc.es vicente.ojea@udc.es carlos.peinador@udc.es jaime.rodriguez@udc.es maria.ruiz.pita-romero@udc.es	
Web	campusvirtual.udc.es/moodle/			
General description	The course provides basics of Organic Chemistry for students of Degree in Chemistry			

Study programme competences	
Code	Study programme competences
A1	Ability to use chemistry terminology, nomenclature, conventions and units
A4	Knowledge of main types of chemical reaction and characteristics of each
A6	Knowledge of chemical elements and their compounds, synthesis, structure, properties and reactivity
A9	Knowledge of structural characteristics of chemical and stereochemical compounds, and basic methods of structural analysis and research
A10	Knowledge of chemical kinetics, catalysis and reaction mechanisms
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
A21	Understanding of qualitative and quantitative aspects of chemical problems
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
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

Learning outcomes			
Learning outcomes		Study programme competences	
Understand basic concepts, principles and theories related to the Organic Chemistry		A1	B2 B3 B4 C1
		A4	
		A6	
		A9	
		A10	
		A14	
		A15	
		A21	

Use and get use to the Organic Chemistry Nomenclature, using main conventions and units	A1 A6 A9 A14	B2 B3	C1 C3
Understand the characteristics and main properties of organic compounds.	A1 A9 A14 A21	B2 B3	
Adquire the expertise to solve structural and synthetic problems in Organic Chemistry being able to relate functional groups and their reactivities.	A1 A4 A9 A14 A15 A21	B2 B3 B4	C3
Understand the most important type of organic reactions, the mechanistic pathways and its stereochemical features.	A1 A4 A6 A9 A10 A21	B2 B3 B4	C1 C3
Design and planning in Organic Synthesis. Relationships between spectroscopic data and functional groups in Organic Chemistry.	A1 A4 A9 A14 A15	B2 B3	C3
Adquire expertise in literature searches from Organic Chemistry sources.	A6 A9 A14	B3 B4	C1 C3
The Organic Chemistry as a part of our lives	A14 A15 A21	B4	C1 C3

Contents	
Topic	Sub-topic
1. Chemical structure and chemical bonding in organic molecules	Lewis Structures. Resonance Structures. Atomic and hybrid orbitals. Chemical structure and bonding on methane, ethene and ethyne.
2. Organic reactions	Characteristics of the organic compounds. Types of reaction Mechanisms. Types of reagents: acids and bases, oxidants and reducers, electrophilicity and nucleophilicity. Classification of the Organic reactions. Thermodynamic and kinetic features of Organic Reactions. Kinetic and thermodynamic control. Reaction intermediates.
3. Alkanes and cycloalkanes. Reactions	Physical properties. n-Alkanes: Rotational barriers. Conformational isomerism. Cycloalkanes: ring strain.
4. Stereochemistry	Optical activity. Chirality and enantiomers. Nomenclature. Diastereoisomers. Stereoisomerism in cyclic molecules.
5. NMR Spectroscopy	Basic principles of the NMR. The most important nuclei studied in Organic Chemistry. The chemical shift, Spin-spin coupling: N+1 rule. Identification of Organic functional groups by NMR.
6. Reactions of Alkanes.	Halogenation. Pyrolysis. Combustion. Cracking.



7. Alkyl Halides	Chemical structure and properties. Nucleophilic substitution reactions (SN). Factors determining the SN mechanisms: substrate (structure of the alkyl group and nature of the leaving group, nucleophilicity of the reagent and solvent effects. Competitive processes in the SN reaction: transpositions and eliminations. Organometallic compounds. Reduction of alkyl halides.
8. Alcohols	Chemical structure. Acid-base properties. Reactions through the O-H bond. Reactions through the C-O bond. Oxidation. Thiols.
9. Ethers	Chemical structure. Ether cleavage. Epoxides. Thioethers.
10. Amines	Structure and properties. Acid-base reactions. Alkylation of amines. Hoffman's elimination. Oxidation: Cope's elimination.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Mixed objective/subjective test	A1 A4 A6 A9 A10 A14 A15 A21 B3 B2 C1	5	0	5
Seminar	A1 A4 A6 A9 A10	10	25	35
Guest lecture / keynote speech	A1 A4 A6 A9 A10	20	30	50
ICT practicals	A6 A9 A21 B2 B4 C3	10	10	20
Workshop	A1 A4 A6 A9 A10 B2 B4	10	30	40
Personalized attention		0	0	0
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Mixed objective/subjective test	A final exam will be introduced at the end of the semester. This is planned to objectively assess the degree of understanding by the student, as well as the ability to apply the course contents. This test will include a single type of questions (related to the structure, structural elucidation, reactivity and synthesis of organic compounds), in order to determine whether the answers are correct or not.
Seminar	Sessions devoted to the resolution of problems and questions related to the course contents, with the active participation of students. This methodology is intended to the whole group.
Guest lecture / keynote speech	The teacher presents the basic contents of each unit. These materials will be provided in advance to the students in order to study them before the development of the class. This methodology is intended to the whole group.
ICT practicals	Practicals will be mainly focused on two aspects: 1. The use of software tools for the three-dimensional representation of organic compounds, and the application of such tools on solving stereochemistry and conformational analysis problems. 2. The structural elucidation of organic compounds by means of proton NMR with the support of software for the simulation of spectra.
Workshop	The teacher will assign students the preparation of some problems, that would require the integration of contents from different subjects. Then, students should study the problems and prepare a solution in writing, which must be submitted to the teacher prior to the development of this activities in the classroom. During the classes, students will present orally some of the problems assigned, and will have to answer to issues that may arise in this regard.

Personalized attention	
Methodologies	Description
Seminar ICT practicals Workshop	

Assessment			
Methodologies	Competencies	Description	Qualification
Mixed objective/subjective test	A1 A4 A6 A9 A10 A14 A15 A21 B3 B2 C1	Final written test.	70
Seminar	A1 A4 A6 A9 A10	The evaluation will consider the attendance, participation, and completion of a collection of practice tests of proposed problems.	5
ICT practicals	A6 A9 A21 B2 B4 C3	The follow up and participation on the practical sessions will contribute a 5% to the final grading. The students will have to deliver a written final report of the practicals. This report will contribute another 5% to the evaluation.	10
Workshop	A1 A4 A6 A9 A10 B2 B4	Attendance, participation, and the quality of the written solutions in the take home assigned problems will be evaluated. The students will deliver the written solutions before of each presentation. Additionally the clarity and precision of explanations, as well as the use of appropriate nomenclature for the compounds and reactions it will be evaluated.	15

Assessment comments
The assistance to the ICT practical is a necessary requirement for passing the course. The final grade will be based on your performances in the all activities. The exam will make up 70%, seminar 5%, ICT practicals 10%, and workshop 15%. Each activity (except for seminar) should reach a minimum score of 4 out of 10. A final score of 5 out of 10 is needed in order to pass the entire course. The scores obtained on the practicals, seminars and workshop classes will be preserved to the "second opportunity" of an academic course. Those students participating in less than a 70% of the planned activities will obtain an assesment of "not attended". Students evaluated in the "second chance" shall be eligible for "class honors" if the maximum number of those marks for the corresponding course has not been fully covered in the "first opportunity". Part-time dedication students with academic waiver exempting assistance, will be provided with a flexible schedule according with coordination time-table, available material and human resources. The remaining activities (seminars and workshop) will be evaluated in the final written test. Part-time dedication students unable to attend the ICT practicals, will be evaluated with complemetary questions about the laboratory practices in the final writing test. This part will acoount for the 10% of the final grade.

Sources of information	
Basic	- K.P.C. VOLLHARDT and N.E. SCHORE (2007). Organic Chemistry (5ª ed). Barcelona, Omega - L.G. WADE, Jr. (2004). QUÍMICA ORGÁNICA (5ª ed). Madrid, Pearson Educación - E. QUIÑOÁ y R. RIGUERA (2004). CUESTIONES Y EJERCICIOS DE QUÍMICA ORGÁNICA (2ª ed). Madrid, McGraw-Hill
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Química 1/610G01007 Química 2/610G01008 Química 3/610G01009 Química 4/610G01010
Subjects that are recommended to be taken simultaneously



Subjects that continue the syllabus

Química Orgánica 2/610G01027

Ampliación de Química Orgánica/610G01028

Experimentación en Química Orgánica/610G01029

Química Orgánica Avanzada/610G01030

Other comments

We highly recommend as main sources of information the books: Wade 2004 and Vollhardt, 2007. We also recommend the reading of the main subjects of each topic, as preparation to the teacher's keynote lectures.

(*)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.