



## Teaching Guide

Teaching Guide				
Identifying Data				2019/20
Subject (*)	Organic Chemistry 1		Code	610G01026
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Second	Obligatory	6
Language	SpanishEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Ruiz Pita-Romero, Maria	E-mail	maria.ruiz.pita-romero@udc.es	
Lecturers	Ojea Cao, Vicente Pazos Chantrero, Elena Ruiz Pita-Romero, Maria	E-mail	vicente.ojea@udc.es elena.pazos@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 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 and know basic concepts, principles and theories related to Organic Chemistry	A1 A4 A6 A9 A10 A14 A15 A21	B2 B3 B4	C1
Use Organic Chemistry terminology, including nomenclature, main conventions, and units	A1 A6 A9 A14	B2 B3	C1 C3



Know the characteristics and properties of organic compounds.	A1 A9 A14 A21	B2 B3	
Acquire the ability to solve structural and synthetic problems in Organic Chemistry through the analysis of the present functional groups and the application of the acquired knowledge regarding their properties and reactivity	A1 A4 A9 A14 A15 A21	B2 B3 B4	C3
Know the main types of organic reactions, their mechanistic pathways and their main stereochemical features.	A1 A4 A6 A9 A10 A21	B2 B3 B4	C1 C3
Acquire the ability to use literature, as well as to search for specific information in Organic Chemistry	A6 A9 A14	B3 B4	C1 C3

Contents	
Topic	Sub-topic
Unit 1. Structure and reactions of organic compounds	Characteristics, structure and bonding of organic compounds: functional groups, Lewis structures, hybrid atomic orbitals, resonance. Organic Reactions: classification, types of reagents, types of reaction mechanisms. Thermodynamic and kinetic features of organic reactions. Kinetic and thermodynamic control. Reaction intermediates.
Unit 2. Stereoisomerism	Nomenclature, properties and isomerism of alkanes. Constitutional isomerism and stereoisomerism. Conformational isomerism: conformational analysis of alkanes and cycloalkanes, Newman projections. Optical isomerism, chirality and symmetry. Enantiomers and diastereoisomers: nomenclature, Fischer projections. Resolution of racemic mixtures.
Unit 3. NMR Spectroscopy	Basic principles of the NMR. Most important nuclei in Organic Chemistry. Chemical shift, Spin-spin coupling: N+1 rule. Identification of functional groups by NMR.
Unit 4. Alkanes	Halogenation, pyrolysis, cracking, combustion.
Unit 5. Alkyl Halides	Nomenclature, structure and properties. Nucleophilic substitution reactions (SN): factors determining the mechanism of nucleophilic substitutions: substrate (structure of the alkyl group and nature of the leaving group), nucleophilicity of the reagent and solvent effects. Elimination reactions. Competitive processes in the SN reaction: transpositions and eliminations. Organometallic compounds. Reduction of alkyl halides.
Unit 6. Alcohols	Nomenclature, structure and properties. Acid-base behavior. O-H bond reactions. C-O bond reactions. Oxidation. Thiols.
Unit 7. Ethers	Nomenclature, structure and properties. Ether cleavage. Epoxides. Thioethers.
Unit 8. Amines	Nomenclature, structure and properties. Acid-base reactions. Alkylation of amines. Hofmann's elimination. Oxidation: Cope's elimination.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours



Guest lecture / keynote speech	A1 A4 A6 A9 A10	20	30	50
Seminar	A1 A4 A6 A9 A10	10	25	35
Workshop	A1 A4 A6 A9 A10 B4 B2 C1	10	30	40
ICT practicals	A6 A9 A21 B2 B4 C3	10	10	20
Mixed objective/subjective test	A1 A4 A6 A9 A10 A14 A15 A21 B2 B3 C1	4	0	4
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	The teacher will present the fundamental contents of each subject that will be previously provided to the students in order to prepare them on their own before the class. With the help of these materials and other bibliographic resources, students must prepare the lessons before the lectures. The participation of the students will be encouraged, with the intention that questions will be asked during the lesson (or before or afterwards by e-mail)
Seminar	Sessions dedicated to solving problems and questions with an active participation of the student. Problems to be resolved will be available on Moodle platform before the seminars. Students must work on the problems before the seminars.
Workshop	The workshops are work sessions organized in small groups. The teacher will assign the students the preparation of some problems, which may require the integration of contents from different units. Students must prepare and hand in solutions for the assigned problems before the workshops. During the workshop sessions the students will present the problems and answer the questions that arise.
ICT practicals	Practicals will be fundamentally focused on two aspects: (1) the two and/or three-dimensional representation of organic compounds through the use of computational tools, aimed at the analysis and resolution of stereochemistry problems; (2) the structural determination of organic compounds based on <sup>1</sup> H NMR with the support of spectra simulation programs.
Mixed objective/subjective test	In order to evaluate the knowledge and the ability to apply the subject contents by the student, a mixed test is scheduled. The test will include questions and problems analogous to those solved in the seminar and workshop sessions during the course, related to nomenclature, structure, structural determination, reactivity and synthesis of organic compounds.

Personalized attention	
Methodologies	Description
ICT practicals Workshop	Students will have the assistance from the teacher during tutorials (in addition to the classroom activities) for the resolution of doubts and questions that may arise from the study of contents, the preparation of the solution report for the workshops or the final report in the ICT practices. Personalized attention will be also supported by e-mail.  For the students with recognition of part-time dedication or in specific modalities of learning or supporting to diversity, personalized attention will be provided with all the flexibility that the coordination schedules and the material and human resources available can offer.

Assessment			
Methodologies	Competencies	Description	Qualification
Mixed objective/subjective test	A1 A4 A6 A9 A10 A14 A15 A21 B2 B3 C1	It will take place during the official examination period, on the dates established by the Center. The test will consist of a written exercise with problems and questions analogous to those solved in the seminars, workshops and practicals.	75
ICT practicals	A6 A9 A21 B2 B4 C3	The participation in the practicals will contribute with a 5% to the evaluation. The students will prepare a final report on the exercises of the practices that will contribute with another 5% to the evaluation.	10

Workshop	A1 A4 A6 A9 A10 B4 B2 C1	The quality of the written solutions that had been handed in in advance will be evaluated, as well as the participation during the workshops by means of the formulation of questions or answers. During the presentation of the problems, the use of the appropriate nomenclature for compounds and reactions, the clarity and specification of the explanations and the answers to the questions that arise will be evaluated.	15
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#### Assessment comments

The assistance to the ICT practicals is an essential requirement to pass the course. To pass the subject it is necessary to obtain in the mixed test a note equal to or greater than 5. Therefore, students with a global grade equal to or greater than 5 who have not reached the qualification of 5 in the mixed test will be graded as not pass (grade of 4.5). Students who have not completed the practicals and have not carried out the mixed test will get the No Presented qualification.

The qualifications of the laboratory practicals and the workshops will be maintained at the second opportunity. Therefore, in the second opportunity students will take only the mixed test, whose qualification will replace the one obtained in the mixed test of the first opportunity. The students evaluated in the second opportunity will only be eligible for the Honored Grade (Matrícula de Honor) if the maximum number of these for the corresponding course has not been covered in full at the first opportunity.

Students with recognition of part-time dedication will be evaluated with the criteria listed above.

Students with special academic permission could be exempted from the workshops attendance (15% of the overall grade) and could be evaluated by means of ICT practicals and

the mixed test, both in the first and second opportunity. For those

students who took advantage of the workshop attendance waiver, the mixed test

will contribute to 90% of the overall score. The attendance to the ICT practicals is mandatory to pass the subject and it will be facilitated within the flexibility

that the coordination schedules and the material and human resources available can offer. In the case of exceptional, objectivable and adequately justified circumstances, the QO1 coordinator could exempt a student from attending the process of continuous evaluation of ICT practicals. The student who is in this circumstance must pass a specific examination (corresponding to 100% of the grade) precluding any doubt about the achievement of the knowledge, skills and competences of the subject.

#### Sources of information

<b>Basic</b>	<ul style="list-style-type: none"> <li>- K. P. C. Vollhardt, N. E. Schore (2007). Química Orgánica: estructura y función. Omega</li> <li>- L.G. WADE, Jr. (2004). QUÍMICA ORGÁNICA (5ª ed). Madrid, Pearson Educación</li> <li>- E. QUIÑOÁ y R. RIGUERA (2004). CUESTIONES Y EJERCICIOS DE QUÍMICA ORGÁNICA (2ª ed). Madrid, McGraw-Hill</li> <li>- K.P.C. VOLLHARDT and N.E. SCHORE (2011). Organic Chemistry 6th edition. WH Freeman and Company</li> <li>- T. W. G. Solomons, C. B. Fryhle (2008). Organic Chemistry. John Wiley &amp; Sons</li> </ul>
<b>Complementary</b>	

#### Recommendations

Subjects that it is recommended to have taken before



General Chemistry 1/610G01007  
General Chemistry 2/610G01008  
General Chemistry 3/610G01009  
Chemistry Laboratory 1/610G01010

**Subjects that are recommended to be taken simultaneously**

**Subjects that continue the syllabus**

Organic Chemistry 2/610G01027  
Intermediate Organic Chemistry/610G01028  
Experimental Organic Chemistry/610G01029  
Advanced Organic Chemistry/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.