UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2020/21
Subject (*)	Organic Chemistry 2		Code	610G01027
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatory	6
Language	SpanishEnglish			
Teaching method	Hybrid			
Prerequisites				
Department	Química			
Coordinador	Perez Sestelo, Jose		E-mail	jose.perez.sestelo@udc.es
Lecturers	García Romero, Marcos Daniel Peinador Veira, Carlos Perez Sestelo, Jose		E-mail	marcos.garcia1@udc.es carlos.peinador@udc.es jose.perez.sestelo@udc.es
Web				
General description	Organic Chemistry 2 is, after Organic Chemistry 1, the second course of general organic chemistry. During the second semester of the course, the student will go further studying the structure and reactivity of organic functional groups. Prof Pérez Sestelo and García Romero are charged of the teaching in english.			
Contingency plan	1. Modifications to the contents No changes will be made 2. Methodologies *Teaching methodologies that are maintained All methodologies are maintained and adapted to a non-face-to-face mode and are carried out in the Moodle and Teams virtual classroom *Teaching methodologies that are modified Master sessions: Will take place through the Teams platform and will be recorded and hosted in Stream. The link will be available in Moodle. Seminars: they will be held through Teams and will also be recorded and stored in Stream. The use of the Moodle and BACON platforms remain unchanged. Workshops: students must submit assignments through the Moodle platform. You can also request to present the tasks through the Teams platform or oral explanations (it is not possible to use two videos). Mixed test: it will be done through the Moodle platform 3. Mechanisms for personalized attention to students Activities will be tracked through teams, moodle and email. - Email: permanent. - Moodle: Daily; according to the needs of the students. - Teams: Master sessions, seminars and tutorials. 4. Modifications in the evaluation There is no case of suspension of face-to-face activities to be evaluated in accordance with the following percentages: Laboratory practices: 15% Seminars: 15% Workshops: 40% Test: 30% *Evaluation observations: Observations to the evaluation of this teaching guide are maintained 5. Modifications to the bibliography or webgraphy It is recommended to use the electronic book platform (ebook) that can be accessed to different Xeral Organic Chemistry books.			

Study programme competences / results	
Code	Study programme competences / results
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
A17	Ability to work safely in a chemistry laboratory (handling of materials, disposal of waste)
A19	Ability to follow standard procedures and handle scientific equipment
A20	Ability to interpret data resulting from laboratory observation and measurement
A21	Understanding of qualitative and quantitative aspects of chemical problems
A23	Critical standards of excellence in experimental technique and analysis
A26	Ability to follow standard laboratory procedures in relation to analysis and synthesis of organic and inorganic systems
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
B7	Effective workplace communication
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)

Learning outcomes			
Learning outcomes	Study programme competences / results		
Recognize and use the terminology of organic chemistry including nomenclature, rules and units.	A1		
Know the main organic reactions, mechanisms, features and stereochemical outcome.	A1 A4 A6 A9 A10 A14	B3	C1
Knowing the structure, properties and chemical reactivity of organic compounds	A1 A4 A6 A9 A14	B3 B4 B7	C1
Carry out standard operations of laboratory for the preparation, separation and purification of organic compounds, handling of materials, reagents and waste in a safe form	A1 A17 A19 A20 A21 A23 A26	B2 B3 B4 B7	C1

Study the main procedures to synthetize organic compounds and their application in the resolution of synthetic problems	A1 A4 A6 A9 A14 A15 A21	B2 B3 B4	C1
Apply the spectroscopy and spectrometric methods for the determination of the structure of organic compounds	A1 A9 A15	B2 B3 B4	C1

Contents	
Topic	**Sub-topic**
Chapter 1. Alkenes and alkynes.	Alkenes: nomenclature, structure and properties. Catalytic hydrogenation. Electrophilic addition reactions. Addition of hydrogen halides, halogens, water, oxymercuration, formation of halohydrins, and hydroboration. Alkene epoxidation and hydroxylation. Oxidative cleavage of alkenes. Radical halogenation. Polymerization. Alkynes: nomenclature, structure and properties. Preparation by elimination reactions and by using acetylides. Reductions and electrophilic addition reactions.
Chapter 2. Conjugate systems	Allylic systems: resonant forms, electronic structure and reactivity: radical halogenation and substitution reactions Dienes: electronic structure and reactivity: electrophilic addition.
Chapter 3. Benzene and aromaticity	Aromatic compounds: nomenclature, electronic structure and properties: Hückel rule. Electrophilic aromatic substitution on benzene: halogenaton, nitration, sulfonation and Friedel¡-Crafts reactions. Orientation in the Electrophilic aromatic substitution on benzene derivatives. Reduction of aromatic compounds. Nucleophilic substitution reactions of aryl halides.
Chapter 4. Aldehydes and ketones	Nomenclature, structure and properties. Nucleophilic addition reaction: hydration, hemiacetals, ketals, thioketals, imines, enamines and cyanohydrins. Addition of organometallic reagents. The Wittig reaction. Reduction of carbonilyc compounds. Aldehydes and ketones oxidation.
Chapter 5. Carboxylic acids	Nomenclature, structure and properties. Nucleophilic substitution at the carboxylic carbon: addition-elimination mechanism. Formation of esters, acyl halides, amides and anhydrides. Reaction of carboxylic acids with organometallic reagents. Reduction of carboxylic acids.

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Laboratory practice	A1 A9 A17 A19 A20 A23 A26 B3 B4 B7 C1	20	14	34
Guest lecture / keynote speech	A1 A4 A6 A9 A10 A14	17	34	51
Seminar	A1 A4 A6 A9 A10 A14 A15 A21 B2 B3 B7	7	21	28

Workshop	A1 A6 A9 A10 A14 A15 A21 B2 B3 B4 B7 C1	8	24	32
Mixed objective/subjective test	A1 A4 A6 A9 A10 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
Laboratory practice	The student will perform experimental procedures in the laboratory related with the theoretical contents of Organic Chemistry 1 and Organic Chemistry 2, and will acquire skills in the preparation, separation, purification and structural determination of organic compounds. During the practices the student will elaborate a written report of the laboratory work, describing the stoichiometric calculations, reaction and work-out procedures, interpretation of the spectroscopic data and answers to the questions posed in the scripts.
Guest lecture / keynote speech	In this master sessions, the teacher will develop the basic contents of the program through theoretical explanations and practical examples. The outlined contents and/or the presentations will be available in the web of Organic Chemistry web site (moodle) before lessons. With the helping materials and other bibliographic resources, the students must prepare the lessons prior to the teacher?s lecture. Participation will be encouraged, thru questions or e-mails before or after the lesson.
Seminar	At the end of each topic there will be seminars where exercises will be solved. The exercises to be solved will be available on the subject website (moodle) prior to the development of the seminars. Students must work on the problems of the bulletins prior to the development of the seminars. The resolution of a moodle questionnaire and the use of the BACON platform will be proposed.
Workshop	The workshops constitute sessions of work organised in reduced groups of students. In these sessions the students will perform oral exposures (with graphic support in the blackboard or by means of a presentation) over specific problems of the bulletins, on which they will have previously written a short report, that should be delivered to the professor at the begining of the sessions
Mixed objective/subjective test	In order to evaluate the knowledge and acquired skills, a written test is scheduled in accordance with the Faculty calendar. In this test the students will have to resolve questions and problems related to the subjects worked on class. Problems will be similar to those postured during the seminars, workshops and laboratory practices.

Personalized attention	
Methodologies	Description
Laboratory practice Workshop Guest lecture / keynote speech Seminar	Students will have the assistance from the teacher to resolve any doubts that may arise from the study of contents, the preparation of the report in the laboratory practices, and the written solutions to the problems to be presented in the workshops. Personalized attention will be also supported by e-mail.

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Laboratory practice	A1 A9 A17 A19 A20 A23 A26 B3 B4 B7 C1	The activities programed in the lab are mandatory to pass the course. The assessment will be performed taking into account the experimental work done and the skills exhibited in the lab and the laboratory notebook.	15

Workshop	A1 A6 A9 A10 A14 A15 A21 B2 B3 B4 B7 C1	The evaluation of the workshops will be continuous and the quality of the oral presentations and the written solutions to the entrusted problems will be valued. Particular attention will be paid to the use of the appropriate nomenclature for functional groups and reaction mechanisms, as well as the clarity and specificity of the explanations and answers to the questions raised in the sessions.	20
Seminar	A1 A4 A6 A9 A10 A14 A15 A21 B2 B3 B7	The resolution of the exercises will be assesed, as well as the formulation of questions before or after the development of the classes and seminars. In particular, the monitoring of the subject through the moodle and BACON platforms through the completion of questionnaires.	10
Mixed objective/subjective test	A1 A4 A6 A9 A10 A15 A21 B2 B3 C1	In order to evaluate the knowledge and skills acquired during the course, a written test is programed in accordance with the calendar of the Centre. In this test the students will have to resolve questions and problems on the contents of the matter, that will be analogous to those posed during the seminars, workshops and laboratory practices.	55

Assessment comments

1. The realization of the laboratory practice is mandatory
to pass the subject.
2. To pass the subject, it will be necessary to obtain a
minimum score of 5 in the group of evaluable activities and a minimum grade of
4.5 in the final test.
3. Students who have completed the lab practice and / or
have attended to the workshops in small groups and have not showed up in the final
exam will receive the No Presented grade.
4. The grades of the laboratory practices and the
workshops of the 1st opportunity will remain in the 2nd opportunity. Therefore,
in the 2nd opportunity, students can only take a final test, whose
qualification will replace the one obtained in the test of the 1st opportunity.
5. The students evaluated in the second opportunity can
only opt for the Honor Grade (Matrícula de Honor) if the maximum number of
these for the corresponding course has not been completely covered in the 1st
opportunity.
6.
Students with recognition of part-time or academic exemption
of attendance exemption will be evaluated through laboratory tests and mixed
practices (workshop attendance, corresponding to 15% of the general grade).
Therefore, in the first and second opportunities, the workshops will be
evaluated through the mixed test, which will represent 85% of the general
qualification.

Sources of information

Basic	- K.P.C. Vollhardt and N.E.Schore (2011). Organic Chemistry: structure and function. W H Freeman - L.G. Wade, Jr (2013). Organic Chemistry. Prentice Hall - K.P.C. Vollhardt and N.E.Schore (2007). Química Orgánica: estructura y función. Omega - L.G. Wade, Jr (2004). Química Orgánica. Pearson - L. M. Harwood (2014). Experimental Organic Chemistry. Blacwell Science - M. A. Martínez Grau, A. Csákÿ (2001). Técnicas experimentales en síntesis orgánica. Síntesis Ademais da bibliografía recomendada, a maioría dos libros de Química Orgánica xeral son útiles para seguir os contidos da materia. Recoméndase aos alumnos que descargen e impriman as presentacións de contidos dispoñibles en moodle antes de asistir ás leccións maxistrais, coa intención de que poidan tomar notas das explicacións do profesor sobre os devanditos materiais.
Complementary	- J. Clayden, N. Greeves, S. Warren (2012). Organic Chemistry. Oxford University Press

Recommendations
Subjects that it is recommended to have taken before
General Chemistry 3/610G01009 Chemistry Laboratory 1/610G01010 Organic Chemistry 1/610G01026
Subjects that are recommended to be taken simultaneously
Chemistry Laboratory 2/610G01032
Subjects that continue the syllabus
Intermediate Organic Chemistry/610G01028 Experimental Organic Chemistry/610G01029
Other comments
1. To be able to take the subject with success it is convenient to have taken the course of Organic Chemistry 1 that is taught in the first semester.2. The contents and the competencies to be adquired in the laboratory of Organic Chemistry 2 and in Laboratory of Chemistry are closely related, and both courses should be followed in the same term.