



| Teaching Guide | | | | |
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| Identifying Data | | | | 2014/15 |
| 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 | | | |
| Prerequisites | | | | |
| Department | Química Fundamental | | | |
| Coordinador | Peinador Veira, Carlos | E-mail | carlos.peinador@udc.es | |
| Lecturers | García Romero, Marcos Daniel Peinador Veira, Carlos Rodriguez Gonzalez, Jaime Ruiz Pita-Romero, Maria | E-mail | marcos.garcia1@udc.es carlos.peinador@udc.es jaime.rodriguez@udc.es maria.ruiz.pita-romero@udc.es | |
| Web | campusvirtual.udc.es/moodle/ | | | |
| General description | A materia pretende proporcionar os coñecementos básicos de Química Orgánica ao alumno do Grao en Química. La asignatura pretende proporcionar los conocimientos básicos de Química Orgánica al alumno del Grado en Química. 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 |
| A12 | Ability to relate macroscopic properties of matter to its microscopic structure |
| 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 |
| A16 | Ability to source, assess and apply technical bibliographical information and data relating to chemistry |
| A21 | Understanding of qualitative and quantitative aspects of chemical problems |
| A24 | Ability to explain chemical processes and phenomena clearly and simply |
| A25 | Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life |
| 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) |
| C2 | Oral and written proficiency in a foreign language |
| C3 | Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life |
| C6 | Ability to assess critically the knowledge, technology and information available for problem solving |

| Learning outcomes | |
|--|-----------------------------|
| Subject competencies (Learning outcomes) | Study programme competences |

| | | | |
|--|--|----------------|----------------|
| Understand basic concepts, principles and theories related to the Organic Chemistry | A1 A4 A6 A9 A10 A12 A14 A15 A21 A24 | B2 B3 B4 | C1 C2 |
| Use and get use to the Organic Chemistry Nomenclature, using main conventions and units | A1 A6 A9 A12 A14 A24 A25 | B2 B3 B7 | C1 C2 C3 |
| Understand the characteristics and main properties of organic compounds. | A1 A9 A12 A14 A16 A21 A24 | B2 B3 B7 | C6 |
| Acquire 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 A16 A21 A24 A25 | B2 B3 B4 | C3 C6 |
| 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 C2 C3 |
| Design and planning in Organic Synthesis. Relationships between spectroscopic data and functional groups in Organic Chemistry. | A1 A4 A9 A12 A14 A15 | B2 B3 B7 | C3 C6 |

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| Acquire expertise in literature searches from Organic Chemistry sources. | A6 | B3 | C1 |
| | A9 | B4 | C2 |
| | A14 | B7 | C3 |
| | A16 | | |
| | A24 | | |
| | A25 | | |
| The Organic Chemistry as a part of our lives | A14 | B4 | C1 |
| | A15 | B7 | C2 |
| | A21 | | C3 |
| | A24 | | C6 |
| | A25 | | |
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| Contents | |
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| 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 reductors, 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 (S _N). Factors determining the S _N mechanisms: substrate (structure of the alkyl group and nature of the leaving group, nucleophilicity of the reagent and solvent effects. Competitive processes in the S _N 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 | Ordinary class hours | Student's personal work hours | Total hours |
| Mixed objective/subjective test | 4 | 0 | 4 |
| Seminar | 10 | 25 | 35 |
| Guest lecture / keynote speech | 20 | 30 | 50 |
| ICT practicals | 10 | 10 | 20 |
| Problem solving | 10 | 30 | 40 |
| 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 |
| 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. |
| Problem solving | 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 Problem solving | Personal attention for each student will be integrated on this methodology during interviews before laboratory practices. |

| Assessment | | |
|---------------------------------|---|---------------|
| Methodologies | Description | Qualification |
| Mixed objective/subjective test | Final written test. Competencies assessed: A1, A6, A9, A12, A14, B2, B3 | 70 |
| Seminar | The evaluation will consider the attendance, participation, and completion of a collection of practice tests of proposed problems. Competencies assessed: A1, A4, A10, A15 | 5 |
| ICT practicals | A necessary requirement for passing the entire course is to achieve a passing score in the ICT practicals. Regular attendance to all of your sections is a must. The attendance, follow up and participation on the practical sessions will contribute a 5% to the final grading. In the last training session within the practicals, the students will solve a similar problem to those presented, contributing another 5% to the evaluation. Competencies assessed: A1, A9, A16, B2, B3, B4, C1, C2, C3, C6. | 10 |
| Problem solving | 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. Competencies assessed: A1, A4, A6, A9, A10, A21, A24, A25, B2, B3, B4, B7. | 15 |

| Assessment comments |
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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 problem solving 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 problem-solving classes will be preserved to the "second opportunity" of an academic course. Those students not participating in more than a 25% 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".

Regarding the successive academic years, the teaching-learning process (including the assessment), it refers to an academic course, and therefore would re-start with a new course,including all the planified activities and evaluation procedures.

Sources of information

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| Basic | <ul style="list-style-type: none"> - E. QUIÑOÁ y R. RIGUERA (2004). CUESTIONES Y EJERCICIOS DE QUÍMICA ORGÁNICA (2ª ed). Madrid, McGraw-Hill - 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 |
| Complementary | |

Recommendations

Subjects that it is recommended to have taken before

Química Orgánica 2/610G01027
 Ampliación de Química Orgánica/610G01028
 Experimentación en Química Orgánica/610G01029
 Química Orgánica Avanzada/610G01030

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Química 1/610G01007
 Química 2/610G01008
 Química 3/610G01009
 Química 4/610G01010

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.