



## Teaching Guide

| Teaching Guide           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |                       |           |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------------------|-----------|
| Identifying Data         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        | 2018/19               |           |
| Subject (*)              | Structure and Reactivity of Organic Compounds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        | Code                  | 610509114 |
| Study programme          | Mestrado Universitario en Investigación Química e Química Industrial (Plan 2017)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |                       |           |
| Descriptors              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |                       |           |
| Cycle                    | Period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Year   | Type                  | Credits   |
| Official Master's Degree | Yearly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | First  | Optional              | 3         |
| Language                 | SpanishGalicianEnglish                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |                       |           |
| Teaching method          | Face-to-face                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |                       |           |
| Prerequisites            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |                       |           |
| Department               | Química                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |                       |           |
| Coordinador              | Ojea Cao, Vicente                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | E-mail | vicente.ojea@udc.es   |           |
| Lecturers                | Maestro Saavedra, Miguel Anxo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | E-mail | miguel.maestro@udc.es |           |
|                          | Ojea Cao, Vicente                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        | vicente.ojea@udc.es   |           |
| Web                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |                       |           |
| General description      | Complete and integrated knowledge of the main mechanisms of organic reactions and the main methods used in the mechanism determination of a reaction in Organic Chemistry. Understanding the stereo-electronic effects on the reactivity of organic compounds and cycling processes and the effect of the conformation of acyclic and cyclic compounds on their reactivity, and the Curtin-Hammett Principle. Analysis, in an integrated way, the generation, structure and evolution of reaction intermediates. Deepening principles and synthetic methodologies based on pericyclic reactions. |        |                       |           |

## Study programme competences

| Code | Study programme competences                                                                                                                                                                                           |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1   | Define concepts, principles, theories and specialized facts of different areas of chemistry.                                                                                                                          |
| A2   | Suggest alternatives for solving complex chemical problems related to the different areas of chemistry.                                                                                                               |
| A3   | Innovate in the methods of synthesis and chemical analysis related to the different areas of chemistry                                                                                                                |
| A6   | Design processes involving the treatment or disposal of hazardous chemicals                                                                                                                                           |
| A8   | Analyze and use the data obtained independently in complex laboratory experiments and relating them with the chemical, physical or biological appropriate techniques, including the use of primary literature sources |
| B1   | Possess knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, often within a research context                                                          |
| B2   | Students should apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.                                 |
| B4   | Students should be able to communicate their conclusions, and the knowledge and the reasons that support them to specialists and non-specialists in a clear and unambiguous manner                                    |
| B5   | Students must possess learning skills to allow them to continue studying in a way that will have to be largely self-directed or autonomous.                                                                           |
| B7   | Identify information from scientific literature by using appropriate channels and integrate such information to raise and contextualize a research topic                                                              |
| B10  | Use of scientific terminology in English to explain the experimental results in the context of the chemical profession                                                                                                |
| B11  | Apply correctly the new technologies to gather and organize the information to solve problems in the professional activity.                                                                                           |
| C1   | CT1 - Elaborar, escribir e defender publicamente informes de carácter científico e técnico                                                                                                                            |
| C3   | CT3 - Traballar con autonomía e eficiencia na práctica diaria da investigación ou da actividade profesional.                                                                                                          |
| C4   | CT4 - Apreciar o valor da calidade e mellora continua, actuando con rigor, responsabilidade e ética profesional.                                                                                                      |

## Learning outcomes

| Learning outcomes | Study programme competences |
|-------------------|-----------------------------|
|-------------------|-----------------------------|



|                                                                                                                               |     |      |     |
|-------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|
| 1. Conocer de forma completa e integrada os principais mecanismos das reaccións orgánicas.                                    | AC1 | BC1  | CC1 |
| 2. Conocer os principais métodos empregados na determinación do mecanismo de unha reacción en Química Orgánica.               | AC2 | BC2  | CC3 |
| 3. Comprender os efectos estereoelectrónicos na reactividade dos compostos orgánicos e en procesos de formación de ciclos.    | AC3 | BC4  | CC4 |
| 4. Entender o efecto da conformación dos compostos acíclicos e cíclicos na súa reactividade, y o Principio de Curtin-Hammett. | AC6 | BC5  |     |
| 5. Analizar, de forma integrada, a xeración, a estrutura e a evolución dos intermedios de reacción                            | AC8 | BC7  |     |
| 6. Profundizar nos principios e nas metodoloxías sintéticas basadas en reaccións pericíclicas.                                |     | BC10 |     |
|                                                                                                                               |     | BC11 |     |

| Contents                                                              |                                                                                                                                                 |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic                                                                 | Sub-topic                                                                                                                                       |
| 1. Determination of reaction mechanisms.                              | Types of mechanisms. Classification. Determination procedures.                                                                                  |
| 2. Conformational analysis and chemical reactivity.                   | Thermodynamics of conformations. Implications in reactivity. Influence of the conformations on the result of a reaction.                        |
| 3. Formation, structure and reactivity of the reaction intermediates. | Types of Intermediates. Classification. Structure of intermediates. Determination procedures. Classification of the reactivity of intermediates |
| 4. Pericyclic reactions.                                              | Types of reactions. Characteristics of the polyenic systems.                                                                                    |

| Planning                       |                                                      |                      |                               |             |
|--------------------------------|------------------------------------------------------|----------------------|-------------------------------|-------------|
| Methodologies / tests          | Competencies                                         | Ordinary class hours | Student's personal work hours | Total hours |
| Seminar                        | A1 A2 A3 A6 A8 B1<br>B2 B4 B5 B7 B10 B11<br>C1 C3 C4 | 7                    | 10.5                          | 17.5        |
| Workshop                       | A1 A2 A8 B1                                          | 2                    | 3                             | 5           |
| Case study                     | A2 A3 A6 A8 B2 B4<br>B5 B7 B10 B11 C1<br>C3 C4       | 8                    | 8                             | 16          |
| Objective test                 | A3 A6 A8 B1                                          | 1                    | 4.5                           | 5.5         |
| Guest lecture / keynote speech | A1 A2 A3 A6 A8 B1                                    | 12                   | 18                            | 30          |
| 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                                                                                                                                                                                                                                                                                                                                                                                                   |
| Seminar        | Seven interactive sessions will be held, in which students should actively participate in the analysis and resolution of the problems raised by the teacher. The questionnaires of exercises to be solved will be available on the subject's web (moodle) prior to the delivery of the classes. Students should work on the analysis and resolution of problems prior to the delivery of the seminar classes. |
| Workshop       | Interactive student problem-solving sessions                                                                                                                                                                                                                                                                                                                                                                  |
| Case study     | Presentation and development of concrete aspects of the contents explained by the teacher, in the form of specific works on specific aspects.<br>Resolution and commentary on written tests.                                                                                                                                                                                                                  |
| Objective test | Objective written test of student achievement                                                                                                                                                                                                                                                                                                                                                                 |



|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Guest lecture /<br>keynote speech | 12 lectures are scheduled, in which the teacher will develop the main contents of the program through theoretical explanations, problem solving and practical examples. The content scripts and / or presentations to be developed will be available on the subject's web (moodle) prior to the presentation of the lessons. Based on these materials or on various resources (bibliographies, on the internet ...) students should prepare the lessons in advance to their delivery. The participation of the students will be encouraged, through the elaboration of questions or emails addressed to the professors before, during or after the lesson. |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Personalized attention

| Methodologies          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Workshop<br>Case study | <p>The students will have personalized attention in the teacher's tutoring schedule to clarify the fundamental concepts of the subject in the large groups, the resolution of individual questions presented in the seminars and in the master sessions.</p> <p>In addition, the student can receive personalized attention on any aspect of the subject during the teacher's tutoring schedule.</p> <p>In exceptional, objectivables and properly justified circumstances, the professor may fully or partly exempt any member of the student body to attend the ongoing evaluation process. Students that is in this circumstance must pass a specific test that leaves no doubt about achieving the powers of matter on two occasions.</p> |

## Assessment

| Methodologies                     | Competencies                                         | Description                                                                                                                                                                                                                                                     | Qualification |
|-----------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Guest lecture /<br>keynote speech | A1 A2 A3 A6 A8 B1                                    | The active participation of the students will be evaluated by means of the formulation of questions or by e-mail before or after the expositive sessions.                                                                                                       | 5             |
| Seminar                           | A1 A2 A3 A6 A8 B1<br>B2 B4 B5 B7 B10 B11<br>C1 C3 C4 | The students' active participation in the analysis and resolution of the problems developed by the teacher will be evaluated, as well as the formulation of questions during interactive sessions or before and after the development of the subject by e-mail. | 25            |
| Case study                        | A2 A3 A6 A8 B2 B4<br>B5 B7 B10 B11 C1<br>C3 C4       | The active participation of students in the resolution of problems touched by the teacher will be evaluated, as well as the formulation of questions during the interactive sessions or before and after the development of the subject by e-mail.              | 10            |
| Objective test                    | A3 A6 A8 B1                                          | Final written exam, where students will have to solve problems in a limited time and without support materials similar to those presented during the seminar classes and the oral presentation.                                                                 | 60            |

## Assessment comments

Evaluation by means of an objective test will contribute to 60% of the final qualification. Attendance control and continuous assessment (of the work done in the master sessions, seminars and oral presentations and through the evaluation of the written solutions of the problem bulletins) will contribute to 30% of the final qualification. To obtain APTO qualification it will be necessary to (1) achieve 30% of the partial qualification scores and (2) achieve 50% of the overall score. Students who do not participate in activities that add more than 25% of the final qualification will be qualified as NOT PRESENTED. Students who perform more than 25% of the face-to-face activities and after taking the objective tests do not reach 40% of the score in the same or 50% of the overall score will receive the qualification of NOT SUITABLE.

In accordance with the recommendation of the Quality Commission of the Faculty of Sciences, Honors will be awarded to students who reach the highest marks at the first opportunity. The students evaluated in the second opportunity will only be eligible for Honorary Matriculation if the maximum number of these for the corresponding course was not fully covered at the first opportunity.

In the case of students with recognition of part-time decision-making and academic exemption from attendance exemption, the Responsible Professor may totally or partially exempt from attending the continuous evaluation process. The student who is in this circumstance must pass a specific examination that leaves no doubt about the achievement of the competences of the subject in the two opportunities.

#### Sources of information

|                      |                                                                                                                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic</b>         | Wade, L.G. Química Orgánica, Méxic . Pearson, 2012, QO-437. Clayden J., Greeves N., Warren S. Organic Chemistry. Oxford University Press 2012, QO-439 . |
| <b>Complementary</b> |                                                                                                                                                         |

#### Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

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.