



Faculty of Experimental Sciences

GENERAL SPECIFICATIONS

ACADEMIC YEAR 2022-23

BACHELOR'S DEGREE IN CHEMISTRY

Subject Data

Name:

Química Orgánica II

English name:

Organic Chemistry II

Code:

757509215

Type:

Obligatory

Hours:

	Total	In class	Out class
Time distribution	150	60	90

ECTS:

Standard group	Small groups			
	Classroom	Lab	Practices	Computer classroom
2	0	4	0	0

Departments:

Department of Chemistry

Knowledge areas:

Organic Chemistry

Year:

3

Semester

2nd semester

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TEACHING STAFF

Name:	E-mail:	Telephone
Prof. Dr. Uwe Pischel	uwe.pischel@diq.uhu.es	959219982
Other Data		
<p>Theory classes: Tue 10-11 h (week 1-15) and Thu 9-10 h (week 11-15). 20 sessions.</p> <p>Lab sessions: two weeks, Mon-Fri 16-20 h; Experimental Sciences Labs. 10 sessions.</p> <p>Tutoring (office hours): Office hours: Mon 13-15 h, Tue 16-18 h, Wed 15-17 h; professor's office in Robert H. Grubbs building</p>		

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SPECIFIC INFORMATION OF THE COURSE

1. Contents description:

1.1 In English:

The course "Organic Chemistry II" is taught in the second semester of the 3rd year of the Chemistry Degree studies. The student starts this course after having enrolled in the basic courses "Introduction to the Chemical Laboratory II", "Basic Concepts of Organic Chemistry", and "Organic Chemistry". This has provided the student with the necessary basic knowledge about the work in a chemistry laboratory. In this course the student will acquire theoretical-practical knowledge about synthetic sequences and methodologies in an Organic Chemistry laboratory.

1.2 In Spanish:

La asignatura "Química Orgánica II" se imparte en el segundo cuatrimestre del tercer curso del Grado en Química. El alumno cursará esta asignatura tras las asignaturas básicas de "Introducción al Laboratorio Químico 2", "Conceptos Básicos en Química Orgánica" y "Química Orgánica", por lo que posee los conocimientos básicos necesarios del trabajo en un laboratorio de química. De esta manera se tomará contacto teórico-práctico con secuencias y metodologías sintéticas intermedias dentro de un laboratorio de química orgánica.

2. Background:

2.1 Situation within the Degree:

This 3rd year course provides the transition between basic and advanced studies in Organic Chemistry within the Degree of Chemistry. It is also the course in the general subject of Organic Chemistry with the highest practical component (66% lab, 33% theory).

This course allows the student to broaden and extend his/her knowledge about organic reactions and synthetic methodology. This offers an opportunity to familiarize with basic experimental techniques in organic synthesis, frequently encountered in research laboratories of companies or public institutions.

2.2 Recommendations

Having studied previously the courses "Basic Concepts of Organic Chemistry" (1st year) and "Organic Chemistry" (2nd year) and "Structure Determination of Organic Compounds" (3rd year).

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3. Objectives (as result of teaching):

Study of theoretical problems in organic synthesis, complemented by synthetic techniques/methods and the characterization of organic compounds.

4. Skills to be acquired

4.1 Specific Skills:

C2: Conocer los tipos principales de reacción y las principales características asociadas a cada una de ellas.

C4: Conocer las técnicas principales de investigación estructural, incluyendo espectroscopía.

C11: Conocer las propiedades de los compuestos alifáticos, aromáticos, heterocíclicos y organometálicos.

C12: Conocer la naturaleza y el comportamiento de los grupos funcionales en moléculas orgánicas.

C13: Conocer las principales rutas sintéticas en química orgánica, incluyendo la interconversión de grupos funcionales y la formación de enlaces carbono-carbono y carbono-heteroátomo.

Q3: Competencia para evaluar, interpretar y sintetizar datos e información química.

Q4: Capacidad para reconocer y llevar a cabo buenas prácticas en el trabajo científico y profesional.

Q5: Competencia para presentar, tanto en forma escrita como oral, material y argumentación científica a una audiencia especializada.

P1 - Habilidad para manipular con seguridad materiales químicos, teniendo en cuenta sus propiedades físicas y químicas, incluyendo cualquier peligro específico asociado con su uso.

P2 - Habilidad para llevar a cabo procedimientos estándares de laboratorio implicados en trabajos analíticos y sintéticos, en relación con sistemas orgánicos e inorgánicos.

P4 - Habilidad para manejar instrumentación química estándar, como la que se utiliza para estudios estructurales y separaciones.

P6 - Capacidad para realizar valoraciones de riesgos relativos al uso de sustancias químicas y procedimientos de laboratorio.

4.2 General, Basic or Transversal Skills:

CG1 - Que los estudiantes hayan desarrollado y demostrado poseer habilidades de aprendizaje y conocimientos procedentes de su campo de estudio, siendo capaces de aplicarlos en su trabajo, interpretando datos relevantes para emitir juicios de temas de diversa índole pudiendo transmitirlos a un público tanto especializado como no especializado.

CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio.

CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio.

CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética.

CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado.

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CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía.

B1 - Capacidad de análisis y síntesis.

B2 - Capacidad de organización y planificación.

B6 - Resolución de problemas.

B8 - Trabajo en equipo.

5. Training Activities and Teaching Methods

5.1 Training Activities:

Magisterial theory classes and laboratory classes; individual and tutored work

5.2 Teaching Methods:

Standard group/reduced group

Magisterial lectures consisting of the theory related to the course. Didactic resources: powerpoint presentations.

Laboratory experiments: experimental techniques, discussion of results and conclusions, oral and written presentation of final results.

Seminar sessions about the problem solving related to the theory content of the course.

Test and solving of problems.

5.3 Development and Justification:

Magisterial classes of theory content: Will be realized with the complete group of students. The objective is to structure the concepts of the course. The professor's exposition is supported by audiovisual means.

Laboratory classes: The objective of these sessions is to apply the acquired theory knowledge in practical sessions in the laboratory.

Seminar sessions: Will be used to exercise the acquired theory knowledge in more complex inter-topic problems of theory and practical nature.

Presentation by students: The objective is to encourage the students to expose autonomously their laboratory experience and defend their results in a scientific discussion format.

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
Standard group	T1	T1	T1	T1/S	T2	T2	T2	T2	T2/S	T3	T3	T3	T4	T4/S	T4/S
Laboratory classes													L	L	P

T: theory topic, L: lab classes, S: seminar, P: student presentation of laboratory results

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6. Detailed Contents

Theory content:

Topic 1. Formation and reactivity of enols and enolate ions. Enolate equivalents: enamines. Alkylation of enolates and enamines. Alkylation of 1,3-dicarbonyl compounds. Michael reaction. Alkylation of enones.

Topic 2. Intra- and intermolecular aldol condensations. Cross aldol condensations. Robinson annulation. Claisen condensation. Dieckmann condensation. Mannich reaction.

Topic 3. Advanced oxidation reactions. Oxidations of alcohols. Epoxidations. Sharpless epoxidation.

Topic 4. Chemoselective and stereoselective reductions of carbonyl groups. Reductions of other functions.

Practical content:

Experiment 1. Condensation of benzaldehyde and acetone. The Claisen-Schmidt reaction.

Experiment 2. Enamines. Acetylation of cyclohexanone.

Experiment 3. Synthesis of cinnamic acid by Perkin condensation.

Experiment 4. Mannich reaction with indole.

Experiment 5. Synthesis and determination of the stereochemistry of 1,2-diphenyl-1,2-ethandiol

7. Bibliography

7.1 Basic Bibliography:

Organic Chemistry. J. Clayden, N. Greeves, S. Warren, P. Wothers, ed. Oxford Univ. Press

Organic Chemistry. L. G. Wade, ed. Prentice Hall

7.2 Additional Bibliography:

Experimental Organic Chemistry. L. M. Harwood, C. J. Moody, J. M. Percy, ed. Blackwell

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8. Systems and Assessment Criteria

8.1 System for Assessment:

The assessment system consists of the following components:

Written final exam,
Oral presentation of laboratory activity,
Laboratory report,
Laboratory performance/assistance to practical sessions.

8.2 Assessment Criteria and Marks:

8.2.1 Examinations Convocatory I

In this modus 40% of the course qualification is obtained by continuous evaluation.

This includes:

- attitude and practical capabilities of the student (10% of the total qualification) – mark a)
- oral presentation* and discussion (including experimental and theoretical aspects) of the laboratory experiments (30% of the total qualification) – mark b).

*Which experiment is to be presented will be determined beforehand by the professor. Important: The assistance in the practical sessions (at least 90%) is a mandatory pre-requisite in the “continuous evaluation” modus. Any failure to fulfill this requirement leads automatically to a “non-pass” evaluation of the whole course.

The other 60% of the global qualification of the course will be determined in a final exam. This exam consists of theoretical questions and theoretical/practical problems related to the content of the course. For a “pass” evaluation of the whole course a minimum mark of 5.0 (over 10) in the final exam AND a minimum mark of 5.0 (over 10) in the global evaluation (weighted sum of continuous evaluation component and final exam) is required. The final mark is calculated as follows:

Final mark = $0.1 \times \text{mark a)} + 0.3 \times \text{mark b)} + 0.6 \times \text{mark final exam}$

mark a) and b) correspond to the points mentioned above

In case the exam receives a "non-pass" evaluation, automatically the corresponding exam mark will be stated as final mark.

Requisites for the attribution of “matrícula de honor”: Be the highest final mark(s) in the examined group of students and must be higher than 9.0 (over 10). If the number of students with highest mark exceeds the number of possible “highest honor” evaluations, the final exam mark will be used as differentiating criterion. The maximum number of “highest honor” evaluations is determined by the regulations of the University of Huelva. This evaluation can be only obtained in the first ordinary exam call.

In the final qualification the student's compliance with the basic norms of behavior and functioning, which should be respected by the university community of the Faculty of Experimental Sciences, will be considered. These norms were approved in the Faculty Council.

There are no partial exams. There is no possibility to improve the mark after the realization of the assessment components.

8.2.2 Examinations Convocatory II

This evaluation will be realized in one final exam that counts for 100% of the global mark. This exam consists of theoretical questions and theoretical/practical problems related to the content of the whole course. For approval of the whole course a minimum mark of 5.0 (over 10) on the final exam is required. No marks that were obtained in previous activities/evaluations will be considered. The attribution of “matricula de honor” is excluded. In the final qualification the student's compliance with the basic norms of behavior and functioning, which should be respected by the university community of the Faculty of Experimental Sciences, will be considered. These norms were approved in the Faculty Council.

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8.2.3 Examinations Convocatory III

This evaluation will be realized in one final exam that counts for 100% of the global mark. This exam consists of theoretical questions and theoretical/practical problems related to the content of the whole course. For approval of the whole course a minimum mark of 5.0 (over 10) on the final exam is required. No marks that were obtained in previous activities/evaluations will be considered. The attribution of “matricula de honor” is excluded. In the final qualification the student’s compliance with the basic norms of behavior and functioning, which should be respected by the university community of the Faculty of Experimental Sciences, will be considered. These norms were approved in the Faculty Council.

8.2.4 Extraordinary Convocatory

This evaluation will be realized in one final exam that counts for 100% of the global mark. This exam consists of theoretical questions and theoretical/practical problems related to the content of the whole course. For approval of the whole course a minimum mark of 5.0 (over 10) on the final exam is required. No marks that were obtained in previous activities/evaluations will be considered. The attribution of “matricula de honor” is excluded. In the final qualification the student’s compliance with the basic norms of behavior and functioning, which should be respected by the university community of the Faculty of Experimental Sciences, will be considered. These norms were approved in the Faculty Council.

8.3 Single Final Evaluation:

The “single final evaluation” modus is realized with one exam that counts for 100% of the final mark. This exam consists of theory questions and theory/practical problems related to the content of the course. For a “pass” evaluation a minimum mark of 5.0 (over 10) in the final exam is required.

To opt for this evaluation modus, the student is required to communicate this decision to the coordinating professor of the course. This should be done within the first two weeks of course activity, counted from the first day of classes in this course or, if the enrolment was effectuated after the start of the course, within two weeks counted from the date of enrolment. Opting for the “final evaluation” modus implies the definite renouncement of the possibility to be evaluated in the “continuous evaluation” modus. In accordance with the evaluation regulations of the University of Huelva (approved in the Government Council of the 13th of March 2019) this decision is final and the modus can not be changed back to “continuous evaluation” during the course 2022/23.

In the final qualification the student’s compliance with the basic norms of behavior and functioning, which should be respected by the university community of the Faculty of Experimental Sciences, will be considered. These norms were approved in the Faculty Council.