



## IDENTIFYING DATA

### Organic chemistry

Subject	Organic chemistry			
Code	O01G041V01304			
Study programme	Grado en Ciencia y Tecnología de los Alimentos			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Souto Salgado, José Antonio			
Lecturers	Souto Salgado, José Antonio			
E-mail	souto@uvigo.es			
Web				

**General description** Chemistry plays a key role in any technological or scientific discipline, as it is condensed in the name it sometimes receives as "the Central Science". Chemistry aims to understand the properties of matter and the changes it experiences. Within it, Organic Chemistry, dealing with those compounds mostly based on carbon, is key to many aspects of our daily life. The main building blocks of live matter (proteins, sugars, lipids, nucleic acids, enzymes...) as well as many substances that are part of our world (drugs, pesticides, soaps, textiles, fuels...) are organic molecules. For this reason, it is a discipline well connected to Biochemistry, Molecular Biology, Physiology, Pharmacology, etc. and its knowledge is very relevant in a large number of technological areas as Animal or Vegetable Production, Material Engineering, Food Science, among others

The Organic Chemistry subject in the Food Science degree is an instrumental subject that provides the students with the basic tools they will need to follow further studies and work in their profession, tackle the chemical processes that affect foodstuffs and their additives and the derivation reactions and detection methods associated to the main analytical techniques.

It is intended that the students will acquire a basic knowledge of the discipline that will allow them to understand the structure of organic compounds, their properties and reactions. The approach used for that will be based on relating structure with properties, and properties with reactivity, using reaction mechanisms as the guiding line of the class.

Laboratory practices are a fundamental part of the activities of the course, as they provide a good environment for synthesizing the knowledge and competences acquired during the course, and applying them to a context similar to what the students are going to find outside of school.

English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

## Training and Learning Results

Code	
B1	Students will acquire analysis, synthesis and information-management skills to contribute to planning and conducting research activities in the food field.
B2	Students will acquire and put teamwork skills and abilities into practice, whether these have multidisciplinary character or not, in both national and international contexts, becoming familiar with a diversity of perspectives, schools of thought and practical procedures.
B5	Students will be able to take the initiative and acquire entrepreneurship skills, with a special focus on improving the quality of life.
C1	To know the physical, chemical and biological foundations of food and its technological processes.
C2	To be familiar with the chemistry and biochemistry of food and of its associated technological processes.
C4	To be familiar with the physical and chemical properties of food, as well as the analytical processes that are associated with their establishment.
C13	Ability to analyze food.
D1	Analysis, organization and planning skills.
D3	Ability to communicate, both orally and in writing, in local and foreign languages.

D5 Problem-resolution and decision-making skills.

D8 Critical and self-critical thinking skills.

D11 Striving for quality with focus on awareness about environmental issues.

### Expected results from this subject

Expected results from this subject	Training and Learning Results	
RA1: Understand and properly use nomenclature and terms associated to the discipline.		D3
RA2: Correctly use and interpret different structural representations for organic molecules.		D1 D3 D8
RA3: Identify the main types of organic reactions. Be able to associate structure and properties for the main functional groups. Know the structure and relative stability of the most common intermediates in organic transformations.	C1 C2 C4	D1 D5 D8
RA4: Know the main transformations of organic compounds, their mechanisms and the variables that can affect them.	C1 C2 C4	D1 D3 D5 D8
RA5: Use stereochemical arguments when analyzing organic transformations.	C1 C2 C4	D1 D3 D5 D8
RA6: Interpret NMR, IR and MS spectra of simple molecules.	C4 C13	D1 D5
RA7: Know and use the basic experimental techniques in an Organic Chemistry laboratory. Understand and follow the appropriate safety and environmental rules in the laboratory. Be responsible of the proper disposal of residues.	B1 B2 B5 C13	D1 D5 D11
RA8: Establish relationships between the Organic Chemistry knowledge and that of other subjects.	B1 C1 C2 C4	D5 D8
RA9: Appropriately use the information sources available for searching and selecting information on the subjects of the course.	B1	D1 D8
RA10: Be able to produce reports and to present chemical information in writing in a coherent and structured fashion.	B1	D1 D3 D8

### Contents

Topic	
I. Introduction to Organic Chemistry. Basic tools.	0. Introduction to Organic Chemistry 1. Atoms, orbitals and bonds 2. Representation of organic molecules
II. Structure	3. Functional groups 4. Stereochemistry
III. Structural determination	5. Structural characterization techniques: NMR, MS, IR, UV-VIS.
IV. Reactivity	6. Acidity and basicity. 7. Reaction mechanisms: Reaction profiles. Kinetic and Thermodynamic control. Reaction types. Bond breaking and forming processes. Concerted and step-wise reactions.
V. Model reactions	8. Red-ox reactions 9. Substitution and elimination reactions. 10. Reactions on carbonyl groups
Development of a project in the field of circular economy. Revalorization of Food Industry Residues	4 sessions

### Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	26	26	52
Seminars	14	28	42
Laboratory practical	12	18	30
Problem and/or exercise solving	2	24	26

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

### Methodologies

	Description
Lecturing	Oral exposition of contents. We will use the blackboard, audiovisual or computer resources and molecular models in the explanation of the different concepts. We will use an active methodology and student participation is expected through discussions and the solving of short application problems and questions.
Seminars	Student-solving of problems and exercises related to concepts introduced during lecturing sessions
Laboratory practical	Students are expected to design a circular economy project that focus on the revalorization of residues from the Food Industry. The basic informative material will be available in Moovi. After discussion with the teacher responsible of the subject, the students must perform the corresponding experiments in the lab. All work developed during this practical sessions will be transcribed to a labbook that will be included in the final report.

### Personalized assistance

Methodologies	Description
Lecturing	Continuous individualized assessment of the student progress will be done along the course. Course activities will be adapted and complementary activities proposed to help to overcome weaknesses and enhance strengths. The student can visit room 70 on the second floor of the Manuel Martínez Risco building for solving any question/problem related to the course, or for help with any of the proposed activities in the course. The professor is available also through e-mail (souto@uvigo.es) and his virtual office (office 2493, <a href="https://campusremotouvigo.gal/access/public/meeting/143839604">https://campusremotouvigo.gal/access/public/meeting/143839604</a> )
Laboratory practical	The professor will attend all doubts related to the project. During the lab sessions the professor will supervise the adequate development of the experiments, cleanliness and safety rules
Seminars	The professor will attend any doubt related to the seminar sessions.

### Assessment

	Description	Qualification	Training and Learning Results		
Seminars	During the course problems will be proposed. The students have to solve these problems in room that will be graded. Evaluation will be based in the correctness of answers, quality of argumentation and presentation of the information.	20	B1 B2 B5	C1 C2 C4	D1 D3 D5 D8 D11
	Learning outcomes: RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10				
Laboratory practical	Attendance to the laboratory sessions is compulsory, as is carrying out the work proposed there and the elaboration of a laboratory notebook. The evaluation will be done as follows: 1. Quality of searching work previously developed. (10%) 2. Lab work and results (10%) 3. Lab-book accuracy. (10%)	30	B1 B2 B5	C1 C2 C4	D1 D3 D5 D8 D11
	Learning outcomes: RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10				
Problem and/or exercise solving	The following evaluations will be performed: 1. A short questionnaire will be developed in Moovi. (10%) 2. A long, written exam, at the end of the bimester that includes all concepts introduced during lecturing and seminar sessions. (40%)	50		C1 C2 C4 C13	D1 D5 D8
	Learning outcomes: RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10				

### Other comments on the Evaluation

2.5 points or above in the written exam, will be required for a positive evaluation grade of subject. The percentages above can be modified in the 2ª Edición de la Convocatoria Ordinaria and in the Convocatoria de Fin de Carrera.

In the "Convocatoria de Fin de Carrera", a single exam will account for 100% of the final grade. This test will include multiple choice questions, problems/exercises and a section where the competencies acquired in the laboratory practical sessions will be assessed. If the student doesn't sit this exam or does not pass it, he/she will be evaluated in the conventional way, the same as all other students.

In the "2ª Edición de la Convocatoria Ordinaria", the student can choose to be assessed using continuous evaluation or not. In the former case, the exam will be equivalent to that corresponding to the "1ª Edición", and the remaining grade will be

calculated using the grades obtained in the activities carried out along the course with the same percentages. In the latter, the test will account for 70% of the final grade (the remaining 30% corresponds to the practical, laboratory sessions, needed for a passing grade).

Attendance to a minimum of 80% of the practical sessions (or the performance, at home, of the alternative experimental work proposed in the context of a health emergency) is a requirement for a passing grade. For those students with work or family responsibilities, a set of distance activities, alternative to the laboratory sessions, will be proposed. This situation will need to be documented within the first week of the course or, if it appears during the course, at the date of the contract signature or when this family responsibility arises.

Exam dates have been approved by the "Facultade de Ciencias" and are listed below:

"Fin de carrera": 18th of September 2023 (16:00h)

"1ª Edición": 7th of November 2023 (16:00h)

"2ª Edición": 2nd of July 2024 (16:00h)

In case of disagreement between above stated dates and those officially published by "Facultad de Ciencias", the latest will be considered.

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### Sources of information

#### Basic Bibliography

Jonathan Clayden, **Organic Chemistry**, Brooks Cole, International Ed., 2005

Joel Karty, **Organic Chemistry: Principles and Mechanisms**, W. W. Norton & Company; 1 edition, 2014

Jerry Mohrig, David Alberg, Gretchen Holifmeister, Paul F. Schatz, Christina Noring Hammond, **Laboratory Techniques in Organic Chemistry**, W. H. Freeman; 2014

Joel Karty, **Get Ready for Organic Chemistry**, 2nd, Pearson, 2011

#### Complementary Bibliography

Michael B. Smith, **Organic Chemistry: and acid-base approach**, CRC Press, 2011

Tim Soderberg, **Organic Chemistry With a Biological Emphasis**, UCDavis ChemWiki, 2013

Michael Hornby and Josephine Peach, **Foundations of Organic Chemistry**, Oxford University Press, 2003

Andrew F. Parsons, **Keynotes in Organic Chemistry**, Blackwell Science, 2003

Laurence M. Harwood, John E. McKendrick, Roger C. Whitehead, **Organic Chemistry at a Glance**, Blackwell Science, 2004

Ernö Pretsch, Philippe Bühlmann, Martin Badertscher, **Structure Determination of Organic Compounds Tables of Spectral Data**, Springer, 2009

James W. Zubrick, **The Organic Chem Lab Survival Manual: a student's guide to techniques**, John Wiley and Sons, 2009

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### Recommendations

#### Subjects that continue the syllabus

Biochemistry/O01G041V01302

Physical chemistry/O01G041V01303

Food chemistry and biochemistry/O01G041V01404

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#### Subjects that it is recommended to have taken before

Chemistry: Chemistry II/O01G041V01203

Chemistry: Chemistry I/O01G041V01103