Universida_{de}Vigo

Subject Guide 2022 / 2023

<u> </u>			
chemistry			
V12G350V01923			
Grado en			
Ingeniería en			
Química Industrial			
ECTS Credits	Choose	Year	Quadmester
6	Optional	4th	1st
#EnglishFriendly			
Spanish			
· · · · · · · · · · · · · · · · · · ·			
Longo González, María Asunción			
Longo González, María Asunción			
In this course, the fundamental aspects related to the	structure of orga	nic compounds and	their reactions are
English Friendly subject: International students may re	quest from the te	eachers: a) material	s and bibliographic
	Grado en Ingeniería en Química Industrial ECTS Credits 6 #EnglishFriendly Spanish Longo González, María Asunción Longo González, María Asunción Moure Varela, Andrés mlongo@uvigo.es In this course, the fundamental aspects related to the presented. Particular attention will be paid to polymerichemicals most frequently used on an industrial scale, sectors of interest in the organic chemical industry. English Friendly subject: International students may re	Industrial organic chemistry V12G350V01923 Grado en Ingeniería en Química Industrial ECTS Credits Choose 6 Optional #EnglishFriendly Spanish Longo González, María Asunción Longo González, María Asunción Moure Varela, Andrés mlongo@uvigo.es In this course, the fundamental aspects related to the structure of orga presented. Particular attention will be paid to polymerization methods a chemicals most frequently used on an industrial scale, as well as other sectors of interest in the organic chemical industry. English Friendly subject: International students may request from the total chemical chemical sectors may request from the total chemical sectors of the sectors of th	Industrial organic chemistry V12G350V01923 Grado en Ingeniería en Química Industrial ECTS Credits Choose Year 6 Optional 4th #EnglishFriendly Spanish Longo González, María Asunción Longo González, María Asunción Moure Varela, Andrés mlongo@uvigo.es In this course, the fundamental aspects related to the structure of organic compounds and presented. Particular attention will be paid to polymerization methods and techniques, and chemicals most frequently used on an industrial scale, as well as other

Skills

Code

- B3 CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
- B4 CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering specializing in Industrial Chemistry.
- C4 CE4 Ability to understand and apply the basic knowledge of general chemistry, organic chemistry and inorganic chemistry, and their applications in engineering.
- D2 CT2 Problems resolution.
- D9 CT9 Apply knowledge.
- D10 CT10 Self learning and work.
- D16 CT16 Critical thinking.
- D17 CT17 Working as a team.

Learning outcomes				
Expected results from this subject Train		Training and Lo	earning Results	
(*)	В3	C4	D10	
			D16	
			D17	
New	В3	C4	D2	
	B4		D9	
			D10	
			D16	
			D17	
New	В3	C4	D2	
	B4		D9	
			D10	
			D16	
			D17	

New B3 C4 D10 B4 D16 D17

Contents	
Topic	
1. The organic chemical industry.	1.1. Introduction and general characteristics.
,	1.2. Raw materials
	1.3. Petrochemistry
	1.4. Intermediate products and final products.
2. Fundamental concepts of organic chemistry.	2.1. Bonds, hybridisation and geometry.
, ,	2.2. Hydrocarbons. Aromaticity. Resonant structures.
	2.3. Functional groups.
	2.4. Intermolecular interactions
	2.5. Conformations and isomery.
3. Reactivity of organic compounds.	3.1. Kinetics and mechanisms of reaction.
,	3.2. Homogeneous and heterogeneous catalysis.
	3.3. Reactivity of organic compounds.
	3.3.1. Reactivity of substrates
	3.3.2. Electronic structure of reagents.
	3.3.3. Reaction intermediates
	3.4. Types of organic reactions.
4. Ethylene. Propylene. Intermediate and end-	4.1. Addition reactions.
products. Polymerisation.	4.2. Industrial products from ethylene.
,	4.3. Industrial products from propylene.
	4.4. Polymeric materials. Classifications.
	4.4.1.Polymerisation reactions. Additions and condensations.
	4.4.2. Polyethylene and polypropylene.
5. Fraction C4. Dienes and polyenes. Intermedia	
and end-products. Fibres and elastomers.	5.2. Dienes, types and characteristics.
·	5.3. Synthesis of Diels Alder.
	5.4. Elastomers.
	5.4.1. Isoprene rubbers.
	5.4.2. Isobutylene rubbers.
	5.4.3. 1,3-butadiene rubbers.
	5.5. Fibres
	5.5.1. Acrylic, polyamides and polyesters.
6. Fraction BTX. Intermediate and end-products	
Resins.	6.2. Effect of substituentes. Activators and deactivators.
	6.3. Industrial derivatives of toluene.
	6.3.1. Production of phenol and its derivatives. Phenolic and epoxi resins
	6.3.2. Polyesters. Styrene polymers.
7. Other organic compounds of industrial interes	
	7.1.1. Dyazonium salts . Dyes and pigments.
	7.2. Halogenated compounds. Solvents and insecticides.
	7.3. Oxygene compound. Organic acids, alcohols and ketones of industrial
	interest.
	7.4. Tensoactive agents. Types and characteristics.

	Class barres	Harre autaida tha	Total barre
	Class hours	Hours outside the classroom	Total hours
Problem solving	9	27.5	36.5
Laboratory practical	18	18	36
Mentored work	1.5	14	15.5
Lecturing	16	40	56
Problem and/or exercise solving	2	0	2
Presentation	2	0	2
Objective questions exam	2	0	2

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

Methodologies	
	Description
Problem solving	Throughout the course, exercises will be solved, either in the classroom or autonomously by the students, and handed out for evaluation if needed.

Laboratory practical	Laboratory practices will be carried out, and they will include questions or exercises, which must be
	submitted for evaluation. This activity is mandatory to pass the course.
Mentored work	Topics related to the contents of the course will be proposed to the students, so that they prepare
	an
	individual or group work on any of them.
Lecturing	It will consist of the exposition of the contents of the course, based on the proposed bibliography
	and the documentation provided on the FAITIC platform

Personalized assistance		
Methodologies	Description	
Lecturing	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.	
Problem solving	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.	
Laboratory practical	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.	
Mentored work	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.	

Assessment		0 1161 11			
	Description	Qualification	Tr	ainin	g and
			Learning Result		
Laboratory practical	Attitude, participation and quality of the work carried out in the	20	В3	C4	D9
	laboratorywill be considered. In addition the student will respond to		В4		D16
	questions raised in each of the practices, and deliver the required lab				D17
	reports.				
Problem and/or	Partial tests will be carried out, which will include short answer	30	В3	C4	D9
exercise solving	questions and problems, for the evaluation of the skills acquired in				D16
_	relation to the contents of the course.				
Presentation	The quality of the contents of the delivered work will be evaluated,	20	В3	C4	D10
	together		В4		D16
	with the presentation and the answers to the questions.				D17
Objective questions	There will be a final exam, which will include short questions and	30	В3	C4	D2
exam	problems, to evaluate the acquisition of the competences of the		В4		D9
	course.				D16

Other comments on the Evaluation

Partial tests. During the course there will be a partial eliminatory test, which will include short answer-questions and problems or exercises with a weight in the final grade of 30%

The attendance to laboratory sessions and / or to the partial test will imply a qualification different from Not Presented.

Final exam 1st edition: It will include the contents not evaluated in the partial test, with a relative weight of 30%. Each student can repeat the evaluation of the contents not passed in the partial test.

1st Edition of the qualification record: The final grade will be the weighted sum of those obtained in all the tests carried out (laboratory practices, work presentation and written exams), provided that they have been passed with a grade equal to higher than 5.0. In case of failing or failing to appear to one or both of the written exams, the score of Not passed will be reflected in the qualification record, with a numerical value obtained from the weighted sum of the scores of the lab practices and work presentation. The passed activities (laboratory and work presentation), will be reserved for the second edition of the qualification record.

2nd Edition of the qualification record: The grade will be calculated by adding, with the established weighting, the one reflected in the first edition of the qualification record and the one obtained in the extraordinary final exam, only if a mark equal of higher than 5.0 is obtained in the latter. Otherwise, a final qualification of Not passed will be awarded, with a numerical mark equals to that indicated in the first edition of the qualification record.

Ethical commitment:

The student is expected to exhibit adequate ethical behavior. In the case of detecting unethical behavior (copying, plagiarism, unauthorized use of electronic devices, and others) it will be considered that the student does not meet the necessary requirements to pass the course. In this case, the overall grade in the current academic year will be Not passed (0.0). The use of any electronic device during the evaluation tests will not be allowed unless expressly authorized. The fact of introducing an electronic device not authorized in the exam room will be considered a reason for not passing the subject

Sources of information

Basic Bibliography

Primo Yúfera, E., Química orgánica básica y aplicada. Tomo I y II., Reverté,

Harold, A. Wittcoff, Productos químicos orgáncios industriales. Vol 1. Materias primas y fabricación., Limusa,

Philip S. Baley, **Química orgánica. Conceptos y aplicaciones**, Pearson,

Mª José Climent Olmedo, et al., **Química orgánica. Principales aplicaciones industriales.**, Univ. Politécnica de Valencia, Harold A. Wittcoff, **Productos químicos orgánicos industriales. Vol 2. Tecnología, formulaciones y usos.**, Limusa,

Complementary Bibliography

Green, Mark M., Organic chemistry principles and industrial practice., Wiley -VCH,

McMurry, Química orgánica., Cengage,

Harold A. Wittcoff, Industrial Organic Chemicals, Wilev.

Issa Katime Amashta, et al., **Introducción a la ciencia de los materiales poliméricos. Síntesis y caracterización.**, Univ. País Vasco.,

Recommendations

Subjects that are recommended to be taken simultaneously

Bioelectrochemistry/V12G350V01921

Biotechnological processes and products/V12G350V01922

Subjects that it is recommended to have taken before

Chemistry: Chemistry/V12G350V01205

Experimentation in industrial chemistry 1/V12G350V01505

Experimentation in industrial chemistry 2/V12G350V01602

Chemical engineering 2/V12G350V01503

Industrial chemistry/V12G350V01504

Other comments

To enroll in this course it is necessary to have passed or be enrolled in all the subjects of the courses lower than the course in which this subject is scheduled.

In case of discrepancies, the Spanish version of this guide will prevail.