



IDENTIFYING DATA

Chemical technology

Subject	Chemical technology			
Code	V12G363V01606			
Study programme	Grado en Ingeniería en Tecnologías Industriales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	English			
Department				
Coordinator	Rosales Villanueva, Emilio			
Lecturers	Escudero Curiel, Silvia Rosales Villanueva, Emilio Sanroman Braga, María Ángeles			
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Web				
General description	In this subject, students learn the basic aspects of Chemical Engineering and the fundamentals of the basic operations most employed in industry.			

Skills

Code	
B3	CG3 Knowledge in basic and technological subjects that will enable them to learn new methods and theories, and equip them with versatility to adapt to new situations.
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
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.
D17	CT17 Working as a team.

Learning outcomes

Expected results from this subject	Training and Learning Results		
To know the bases of chemical technology.	B3	C4	D9
To apply mass and energy balances to real systems.	B4	C4	D2 D9 D10 D17
To know and understand the basic aspects of mass transfer.	B3	C4	D9
To know the fundamentals of separation processes and their application to real cases.	B4	C4	D2 D9 D10 D17

Contents

Topic	
Introduction	Chemical Engineering. Basic principles. Chemical processes. Unit conversion and calculation tools

Mass and energy balances	Mass balances for systems without chemical reaction. Mass balances for systems with chemical reaction. Energy balances
Implementation of balances into chemical reactor design	Stoichiometry. Reaction rate. Ideal reactors
Mass transfer	Introduction. Mass transfer equations: individual and global coefficients
Distillation and rectification of liquid mixtures	Vapour-liquid equilibrium. Simple distillation. Rectification. Azeotropic and extractive distillation.
Liquid-liquid extraction	Fundamentals. Binary and ternary mixtures. Factors that affect the separation. Operation by simple contact, multiple contact in direct current, multiple contact in multiple countercurrent
Other operations in chemical processes	Gas absorption. Liquid-solid extraction. Adsorption and ion exchange.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	20	40	60
Problem solving	17	31	48
Laboratory practical	8	8	16
Problem and/or exercise solving	2	8	10
Report of practices, practicum and external practices	0	2	2
Essay questions exam	3.5	10.5	14

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

Methodologies

	Description
Lecturing	Direct oral exposition of the most important contents of the subject by the lecturer.
Problem solving	The lecturer suggests various problems to the students so they can work on them at home. Then, the lecturer solves them in the seminar classes.
Laboratory practical	The students will perform some experiments in the laboratory, solving problems in seminar classes and field practices in companies related to the topics covered throughout the course. In addition, the students will evaluate different processes using simulation software. The aim of the laboratory practices is to deepen basic concepts.

Personalized assistance

Methodologies	Description
Lecturing	The students can ask the lecturer any question about the theoretical and practical aspects of this subject, about this methodology and the correction of the assessment tests.
Problem solving	The students can ask the lecturer any question about the theoretical and practical aspects of this subject, about this methodology and the correction of the assessment tests.
Laboratory practical	The students can ask the lecturer any question about the theoretical and practical aspects of this subject, about this methodology and the correction of the assessment tests.

Assessment

	Description	Qualification	Training and Learning Results		
Problem and/or exercise solving	The students will carry out various tests with problems and short-answer questions. The average mark will represent 30% of the final mark.	30	B3	C4	D2
Report of practices, practicum and external practices	Apart from the mark of the practice report, the lecturer will take into account the attendance as well as the attitude that the students have on the practices.	10		C4	D9
Essay questions exam	Theoretical-practical exam of the basic concepts and procedures related to the subject matter, in the date fixed by the Centre.	60	B3	C4	D2
			B4		D9

Other comments on the Evaluation

The participation of the student in any of the evaluation systems of the subject will imply that the student effectively take the subject and its qualification.

To pass the subject, it is necessary that the student obtains a minimum of 5 points out of 10 in each of the proposed evaluation systems. In the case of students who do not attain the minimum in all evaluation systems, they will fail to achieve the pass mark, with a numerical value obtained by following the percentages of the evaluation systems described above, or equal to that obtained in the non passed part.

In July, the previous marks of the evaluation systems will be kept if a minimum of 5 points out of 10 is achieved; therefore, the students will just have to take an essay or questions exam (theoretical-practical exam).

For students who are allowed by the School to skip the continuous assessment procedure: The qualification of these students will be formed by the mark of the essay & questions exam (90%) and the mark of the practices (10%).

Ethical commitment: The student is expected to present adequate ethical behaviour. In the event that unethical behaviour is detected (copying, plagiarism, unauthorized use of electronic devices, etc.), it will be considered that the student does not meet the necessary requirements to pass the subject. In that case, the overall rating in the current academic year will be fail (0.0). The use of any electronic device for the assessment exams is not allowed unless explicitly authorised. The fact of introducing unauthorised electronic devices in the examination room will be considered as a reason for not to pass the subject in the current academic year and will hold overall rating (0.0)

Sources of information

Basic Bibliography

Himmelblau, D.M., **Basic principles and calculations in chemical engineering**, 7th, Prentice Hall International, 2004

Felder, R.M. and Rousseau, R.W., **Elementary principles of chemical processes**, 3rd, John Wiley & Sons, Inc., 2005

Chopey, N.P., **Handbook of Chemical Engineering Calculations**, 3rd, McGraw-Hill Companies, 2003

Fogler, H.S., **Elements of Chemical Reaction Engineering**, 5th, Prentice Hall International,

Levenspiel, O., **Chemical Reaction Engineering**, 3rd,

Coulson, J.M. and others, **Chemical Engineering vol. 1 and vol 2**, 5th, Butterworth-Heinemann, 2002

McCabe, W.L., Smith, J.C. and Harriott, P., **Unit operations of chemical engineering**, 5th, McGraw-Hill International Editions, 1993

Seader, J.D., Henley, E.J., Roper, D.K., **Separation process principles. Chemical and Biochemical Operations**, 3rd, John Wiley & Sons, Inc., 2011

Complementary Bibliography

Treybal, R.E., **Mass-transfer operations**, 3rd,

Ocón, J. y Tojo, G., **Problemas de Ingeniería Química**, 3rd,

Recommendations

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G360V01102

Physics: Physics 2/V12G360V01202

Mathematics: Calculus 1/V12G360V01104

Mathematics: Calculus 2 and differential equations/V12G360V01204

Chemistry: Chemistry/V12G360V01205

Other comments

Requirements: To enrol in this subject, it is necessary to have passed or be enrolled in every subject of inferior courses. In case of discrepancies, it will prevail the Spanish version of this document.

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of the uncertain and unpredictable evolution of the sanitary alert caused by the *COVID-19, the University of Vigo establishes an extraordinary planning that will be activated in the moment that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in blended or distance learning mode. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance by the students and the teaching staff through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===

* educational Methodologies that keep

Lesson magistral: they will develop by means of synchronous virtual sessions that they will be able to be complemented with videos or other didactic materials.

Resolution of problems: it will be proposed to the students series of problems so that they work on them and that will be reviewed in synchronous virtual sessions.

Practices of Laboratory: it will make only by means of the evaluation of industrial chemical processes by means of the handle of a Chemical processes simulation software.

Educational Methodologies that modify

None adapt all the methodologies to the non face-to-face modality

* Mechanism non face-to-face of attention to the students tutoring.

differentiate two types of mechanisms non face-to-face of attention to the students: generals and individual.

Generals: The lecturers in the schedule established by the centre will connect in a virtual classroom to which will assist all the students and in which the lecturers will orient on the material supplied to the students or will expand concepts according to the established in the educational guide.

Individual: The lecturers will attend in their schedule of tutoring to the students in the virtual room.

* Modifications (if they proceed) of the contents to give

there are not modifications

* additional Bibliography to facilitate the self-learning

is not necessary

* Other modifications

=== ADAPTATION OF THE EVALUATION ===

* Test already made

Proof XX: [previous Weight 00%] [Weight Proposed 00%]

...

* Pending proofs that keep

Proof XX: [previous Weight 00%] [Weight Proposed 00%]

...

* Proofs that modify

[previous Proof] => [new Proof]

* New test

* additional Information

Vulnerable students: It will be made a methodological adaptation, facilitating them additional specific information when it is proved that they cannot have access to the contents provided by the conventional ways.

Evaluation: The systems of evaluation will be developed face to face except Resolution of the university board that indicate that they have to do in non face to face mode, making of this way through the different tools put to disposal of the teaching staff.
