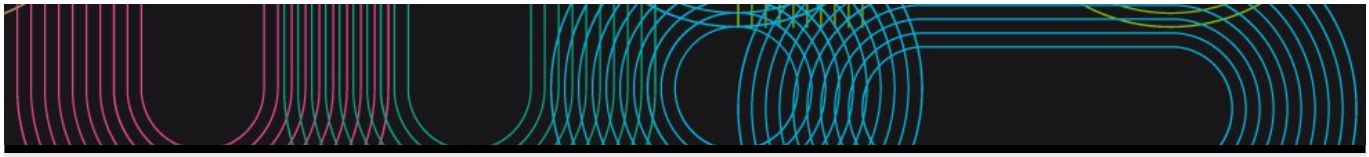

IDENTIFYING DATA				
Chemical technology				
Subject	Chemical technology			
Code	V12G363V01606			
Study programme	Grado en Ingeniería en Tecnologías Industriales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	English			
Department				
Coordinator	Rosales Villanueva, Emilio			
Lecturers	Rosales Villanueva, Emilio Sanroman Braga, María Ángeles			
E-mail	emiliorv@uvigo.es			
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.			

Training and Learning Results	
Code	
B3	CG3 Knowledge of basic and technological subjects that enable students to learn new methods and theories, and to adapt to new situations.
B4	CG4 Ability to solve problems through initiative, decision-making, creativity, critical reasoning, 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 Problem solving.
D9	CT9 Application of knowledge.
D10	CT10 Self learning and work.
D17	CT17 Working as a team.

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	15	40	55
Problem solving	17	31	48
Laboratory practical	8	8	16
Studies excursion	4	1	5
Simulation	4	2	6
Problem and/or exercise solving	3	9	12
Report of practices, practicum and external practices	0	2	2
Objective questions exam	1.5	4.5	6

*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. Besides along the course made diverse controls in which the students will have to resolve problems of the level of similar difficulty to the made in class.
Laboratory practical	The students will perform some experiments in the laboratory related to the topics covered throughout the course. The aim of the laboratory practices is to deepen basic concepts.
Studies excursion	Visits of the students to companies of the surroundings to make an approach to the business reality and visualise the application of the theoretical contents given in the subject.
Simulation	Learning and utilisation of programs of simulation applied to the contents of the subject.

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.
Studies excursion	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.
Simulation	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		
Studies excursion	Questions and activities related to the visit to be made will be carried out. These may take place before or after the visit.	5	B4	C4	D2 D9 D10 D17
Simulation	Realisation of diverse simulations of chemical processes that will have to deliver after the sessions of simulation that will make along the course	15	B3 B4	C4	D2 D9 D10 D17
Problem and/or exercise solving	The students will make diverse controls, stating each one of them of problems.	40	B3 B4	C4	D2 D9

Report of practices, practicum and external practices	It will be evaluated in this item both the realisation of the practices of laboratory like the reasoning and treatment of the results obtained in the development of the practical classes of laboratory.	10		C4	D9 D10 D17
Objective questions exam	This evaluation test includes two types of exams with objective questions: + multiple-choice questions in the lecture sessions, which will represent 10% of the total. + Short questions that will be asked in different controls throughout the course, which will represent 20% of the total value of the exam.	30	B3 B4	C4	D2 D9 D10 D17

Other comments on the Evaluation

ASSESSMENT:

The participation of the student in any of the evaluation systems of the subject(laboratory practicals, problem solving and exercises, simulation, field trip, exam of objective questions) will imply the condition of presented and its qualification in the minutes. A minimum attendance of 75% of the practicals, field trips and simulations of the course is required to have theright to the evaluation of the same. Otherwise, the mark for these evaluation systems will be 0.0.

A student who "does not officially waive the continuous assessment" will be failed if he/she does not achieve a MINIMUM mark of 4.0 points (out of 10) in each of the tests described above. The student will pass the subject if the FINAL GRADE is ≥5.0, that is, if the sum of the grades obtained in the different evaluation systems of the subject is ≥ 5.0.

Second call: In the second round, students will take a final exam in which they will be assessed on all the teaching methodologies applied
throughout the course. This mark will be 100% of the grade.

STUDENTS RELEASED FROM CONTINUOUS ASSESSMENT: When the School releases a student from the continuous assessment process, a "FINAL EXAMINATION" will be held on the
dates established in the school calendar. The grade will be the sum of 90% of the mark obtained in the "FINAL EXAMINATION" and 10% of the laboratory practicals mark.

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.