IDENTIFYING DATA
Introduction to chemical engineering

Subject	Introduction to chemical engineering				
Code	O01G041V01405				
Study programme	Grado en Ciencia y Tecnología de los Alimentos				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish Galician				
Department					
Coordinator	Garrote Velasco, Gil				
Lecturers	Garrote Velasco, Gil Gullón Estévez, Beatriz Romaní Pérez, Aloia				
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Web					
General description	This matter includes the basic principles that govern the behaviour of a process, and that they are the base for the back boarding of the unitary operations and the phenomena of transport involved. More specifically, the appearances that tackle are: - physical Instruments-mathematical - Balances of matter and energy - Kinetical applied and ideal reactors - Introduction to the control of processes				

Training and Learning Results

Code	
A2	Students will be able to apply their knowledge and skills in their professional practice or vocation and they will show they have the required expertise through the construction and discussion of arguments and the resolution of problems within the relevant area of study.
B1	Students will acquire analysis, synthesis and information-management skills to contribute to planning and conducting research activities in the food field.
B3	Students will develop personal skills to engage in critical thinking.
C1	To know the physical, chemical and biological foundations of food and its technological processes.
C5	To be familiar with the basic operations in the food industry.
C6	To be familiar with the industrial processes linked with the processing and transformation of food.
D5	Problem-resolution and decision-making skills.

Expected results from this subject

Expected results from this subject	Training and Learning Results			
*RA1: Know and apply knowledges of mathematics, physical, chemical and engineering.	A2	B1 B3	C1 C6	D5
*RA2: Analyse systems employing balances of matter and energy	A2	B1 B3	C1 C5 C6	D5
*RA3: Capacity to know, comprise and employ the principles of the engineering, of the basic operations and of the processes of the alimentary industries	A2	B1 B3	C1 C5 C6	D5
*RA4: Know the principles of kinetical and his application to the design and operation of ideal reactors	A2	B1 B3	C5 C6	D5

*RA5: Know the foundations for the *implementation of a system of control in an industrial process A2 B1 C5 D5
                                                                             B3 C6

Contents

Topic	
SUBJECT 1) Introduction	1. Definitions of Chemical Engineering 2. Chemical industry and Basic Operations 3. Classification of the Basic Operations
SUBJECT 2) mathematical physical instruments	1. Systems of magnitudes and units 2. Conversion of units 3. Uncertainty. Theory of errors 4. Methods of resolution of equations 5. Linear regression 6. Numerical integration 7. Graphic differentiation
SUBJECT 3) Laws of conservation. General formulation of balances	1. Laws of conservation of matter, energy and quantity of movement 2. Macroscopic and microscopic systems 3. General approach of balances
SUBJECT 4) Material balances	1. Introduction 2. Base of Calculation 3. Atomic balances 4. Biphasic systems in equilibrium
SUBJECT 5) Energy balances	1. General formulation of the macroscopic balance of energy 2. Enthalpy alances 3. Heat exchanged in transformations at constant pressure 4. Law of Hess
SUBJECT 6) Principles of kinetical and ideal reactors	1. Rate of reaction and equation of rate 2. Analysis of the kinetical equation 3. Ideal reactors
SUBJECT 7) Introduction to the control of processes	1. Definitions and basic concepts 2. Strategies of control 3. Instrumentation 4. Analysis and design of systems of control

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	25	53
Seminars	28	38	66
Autonomous problem solving	0	10	10
Laboratory practical	14	7	21

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

Methodologies

	Description
Lecturing	Exhibition in classroom of the basic foundations of the matter. Like support will employ audiovisual material, that will facilitate previously to the students through the platform Moovi.
Seminars	In the seminars will pose and will resolve exercises related with the matter, of parallel form to the sessions of lecturing. The greater part of the exercises will be resolved by the professor, whereas the rest will be able to resolve it the students, in the classroom or of autonomous way. To the beginning of the matter, will facilitate to the students the bulletins of exercises (including the result) through the platform Moovi.
Autonomous problem solving	They will deliver periodically bulletins of exercises through Moovi for his resolution by part of the students, well in class or of autonomous form out of the classroom. The exercises resolved will be able to deliver through Moovi. They will be corrected and evaluated, and considered in the final qualification.
Laboratory practical	Realisation in the laboratory of practices related with the contents of the matter, in groups reduced of 2-3 students. Also it foresees the possibility that some session of practices was devoted to the explanation of the calculations to make. The scripts of the practices will be available in the laboratory and in Moovi. The assistance will be mandatory (having to assist to a minimum of 70% of the sessions). The students will have to elaborate and deliver a memory of practices, including a spreadsheet with the results of each practice.

Personalized assistance

Methodologies	Description
Lecturing	During the classes the participation of the student will be encouraged and expose his doubts. In addition to this, to personalised attention will do through tutorships, individual or in group. These will be able to carry out in presential form or in remote way (email, moovi, remote campus, etc). It will attend to the student when it ask it, whenever it was possible, although it was out of the schedule of tutorships and/or do not have concerted a meeting.
Laboratory practical	Follow-up in the realisation of the practices of laboratory, orienting in the correct handle of the teams, resolving doubts that can arise. Explanation of doubts in the classes of treatments of data and during the preparation of complementary material out of classroom. The student will be able to consult with the professors all the doubts that arise him.
Autonomous problem solving	Explanation of doubts that arise in the resolution of the works/exercises posed. Feedback once corrected, being able to like this the students check the correct form to make them and where made a mistake. The student will be able to consult with the professors all the doubts that arise him, well telematically or presentially.
Seminars	The seminars are devoted to the resolution of exercises. The student will be able to consult with the professors any doubt that arise him.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	Realisation of an examination of all the matter, with questions on the theoretical concepts. Results of learning evaluated: RA1, RA2, RA3, RA4, RA5	15	A2	B1 B3	C1 C5 C6	D5
Seminars	Realisation of an examination of all the matter, including several exercises. Results of learning evaluated: RA1, RA2, RA3, RA4, RA5	40	A2	B1 B3	C1 C5 C6	D5
Autonomous problem solving	Evaluation of the resolution of the exercises proposed made by the students and delivered through Moovi. Results of learning evaluated: RA1, RA2, RA3, RA4, RA5	25	A2	B1 B3	C1 C5 C6	D5
Laboratory practical	It will value the assistance, attitude and aptitude in the laboratory, as well as the memory of practices. Results of learning evaluated: RA1, RA2, RA3, RA4, RA5	20	A2	B1 B3	C1 C5 C6	D5

Other comments on the Evaluation

1) Evaluation system: the preferred evaluation modality is **Continuous Evaluation**. Those students who want **Global Evaluation** (100% in official exam) must notify the responsible of subject, by email (to gil@uvigo.gal) or through Moovi platform (in the first month from the beginning of the teaching).

2) Bimester Final Evaluation (1st edition):

2.1) Exams (55% of the global note): it is necessary to obtain a minimum (4 on 10) in the official exam to be able to approve. In the exam will be able to indicate necessary requirements to surpass the matter (like obtaining a minimum of punctuation in some part of the examination).

2.2) Laboratory practiques (20% of the global note): the assistance to the practices of laboratory (like minimum to 70% of the sessions) and the delivery of the memory is mandatory to be able to pass the subject.

2.3) Autonomous problems solving (15% of the global note): the qualification in this section will be the sum of the obtained in each one of the deliveries of exercises that make the student.

2.4) Qualification of the matter:

- For the student that surpass the exam (with a minimum of 4.5 on 10), the qualification will be the sum of exam + laboratory practiques + autonomos problems solving (applying the corresponding percentages on the global note).
- For the student that do not surpass the exam, the qualification will be the one of the exam (in base 10).
- "No presented": only it will apply to the student that do not have any qualification in any of the methodologies.

3) End of course call: the student that opt for this modality will be evaluated only with the exam (that it will represent 100% of the note). In case of not assisting to the said examination, or not to pass it, will become evaluated to the equal that the rest of students in the others existent opportunities along the course.

4) final Evaluation (2nd edition): in the second edition, the student will be able to choose between that keep him the note of the methodologies of "autonomous problems solving" and "Laboratory practiques" (with respectively 15% and 20% of the total note) and that the exam follow representing 55% of the global note, or that no keep him any of them (adding him the percentage of this methodology to the of the exam).

The option by defect will be to keep the notes obtained in the first edition.

5) Communication with the students: the communication with the students (qualifications, announcements, etc) will make through the platform Moovi.

6) Exams: official dates are:

- End of career: 27 September 2023, 16:00.
- 1st edition: 3 June 2024, 16:00.
- 2nd edition: 11 July 2024, 16:00.

The dates of exams are the approved by the Faculty of Sciences. In case of error in the transcription of the dates, the valid are the approved officially and published in the board of announcements and in the web of the Centre.

7) Ethical Commitment: it expects that the present students a suitable ethical behaviour. In case to detect bad practices like copy, plagiarism, utilisation of any unauthorised electronic device on purpose (usually only will allow the use of calculator) will consider that the student does not gather the suitable requirements to surpass the matter and his global qualification will be of 0.0, in fulfillment of the RD 1791/2010, of 30 December, by which approves the **Statute of the University Student**, article 13.2., relative to the **duties of the university students:** "*Abstain of the utilisation or cooperation in fraudulent procedures in the proofs of evaluation, in the works that make or in official documents of the university*".

Sources of information
Basic Bibliography
Calleja Pardo, G. y col., **Introducción a la ingeniería química**, Síntesis, 1999
Felder, R.M. e Rousseau, R.W., **Principios elementales de los procesos químicos**, 3, Limusa Wiley, 2004
Himmelblau, D.M., **Principios básicos y cálculos en ingeniería química**, 6, Prentice-Hall Hispanoamericana, 1997
Complementary Bibliography
Levenspiel, O., **Ingeniería de la reacciones químicas**, 3, Limusa-Wiley, 2004
Toledo, Romeo T., **Fundamentals of food process engineering**, 3, Springer, 2007
Himmelblau, D.M. e Riggs, J.B., **Basic principles and calculations in chemical engineeering**, 8, Prentice Hall, 2012
Ollero de Castro, P y Fernández Camacho, E., **Control e Instrumentación de Procesos Químicos**, Síntesis, 1997

Recommendations
Subjects that continue the syllabus