Universida_{de}Vigo

Subject Guide 2020 / 2021

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D10 Work at a national and international context D12 Plan and manage time properly

D13 Make decisions

D14 Analyze and synthesize information and draw conclusions D15 Evaluate critically and constructively the environment and oneself

Learning outcomes		
Expected results from this subject	Train	ing and Learning Results
Know the different unit systems.	C1	D7
	C19	
Interpret the flow charts of chemical processes.	C16	
	C19 C20	
Differentiate the steady, pen steady, centinues and batch exercisions	C16	D3
Differentiate the steady, non-steady, continuos and batch operations	C18 C19	D3 D7
	C20	D9
Know and know how to apply the mass and energy balances in steady or not steady processes,	C16	D3
with or without chemical reaction and with recycle, purge and bypass streams	C10 C19	D9
there is manual element reaction and married elements parge and of pass screams	C20	23
Know and know how to apply the mass, energy and momentum conservation laws	C16	D3
	C19	D7
	C20	D9
Pose and solve the design equations to the ideal chemical reactors.	C16	D3
	C20	D4
	C23	D5
Differentiate the heat transfer mechanisms	C16	D3
	C19	D4
lculate the heat transferred by conduction and convection in simple systems and the heat insferred in shell and tube type heat interchanger.	C20	D6
		D7
		D9
Calculate the heat transferred by conduction and convection in simple systems and the heat transferred in shell and tube type heat interchanger.	C16	D4
Identify the different operation units and their application.	C16	D7
	C19	
	C20	
Elaborate and interpretate vapour-liquid, liquid-liquid and gas-liquid flow diagrams.	C21	D1
	C22	D6
	C23	D8
	C25	D10
	C27	D12
	C28 C29	D13 D14
	C29	D14 D15
Solve mass balances for flash and batch distillation, liquid-liquid and solid-liquid extraction and	C21	D15
absorption.	C21	D8
	C23	D10
	C25	D12
	C27	D13
	C28	D14
	C29	D15
Determine the number of theoretical stages in separation units for simple mixtures.	C16	D7
	C19	
	C20	
Carry out and monitor separation processes in operation units at laboratory level.	C21	D1
	C22	D6
	C23	D8
	C25	D12
	C27	D13
	C28	D14
	C29	D15

Determine experimentally some properties of int phenomena: viscosity, coefficients of convection		C16 C20 C21 C22 C23 C25 C27 C28 C29	D1 D4 D5 D7 D8 D10 D12 D13 D14 D15
Work with continuous and batch chemical reacto	rs at laboratory level.	C16 C21 C22 C25 C27 C28 C29	D1 D4 D5 D6 D7 D8 D12 D13 D14 D15
Contents			
Торіс			
Subject 1. Introduction to Chemical Engineering	Origin, concept and evolution of the Chemic and continuous operation. Stationary and no and countercurrent operations. Classificatio Systems of units.	on stationary s	tate. Cocurrent
Subject 2. Mass and energy balances	General equation of balance. Mass balances in systems without chemical reaction in stationary and non stationary state. Recycle, purge and bypass. Mass balances in systems with chemical reaction in stationary and non stationary state. Energy balances. Energy balances in systems with chemical reaction in stationary state.		
Subject 3. Design of ideal reactors	Speed of reaction. Ideal reactors: batch stirred tank reactor, continuos stirred tank reactor and plug flow reactor		
Subject 4. Heat transfer	Mechanisms of heat transfer. heat transfer through flat walls, cylindrical and spherical. Heat exchangers.		
Subject 5. Distillation	Vapour-liquid equilibria. Phase diagrams for distillation. Multistage distillation	-	
Subject 6. Liquid-liquid extraction	Liquid-liquid equilibrium for binary and ternary systems: binodal curve and distribution coefficients. Liquid-liquid extraction in cocurrent and countercurren contact.		
Laboratory sessions	Experimental determination of some proper of view of the design of basic operations: vie convection, density. Operation with chemica Experimental determination of phase equilit capacity of extraction of several solvents in extraction.	scosity, coeffic al reactors at l prium curves.	ients of ab scale. Analysis of the

Planning	Class hours	Hours outside the classroom	Total hours
Lecturing	13	30	43
Problem solving	25	50	75
Laboratory practical	40	3	43
Autonomous problem solving	0	10	10
Presentation	5	5	10
Mentored work	1	10	11
Problem and/or exercise solving	2	8	10
Essay questions exam	3	20	23
*The information in the planning table is fo	r guidance only and does no	ot take into account the het	erogeneity of the studer

Methodologies	
	Description
Lecturing	During these classes (one hour per week) the teacher will explain the most relevant aspects of the subject. The students will have the available documentation on Tem@.

Problem solving	There will be a set of exercises of each subject available for the students. Some of these exercises will be solve in class and other ones will be solved by each student and presented to the teacher in order to be corrected.
Laboratory practical	Laboratory sessions will last 3.5 hours. The experimental procedure will be available for the students and they will have to write a report for each session.
Autonomous problem solving	The students will have to solve some exercises and questions and they will have to present them to the teacher before the deadline.
Presentation	The students will have to make an oral presentation related to the theoretical bases, experimental procedure, obtained results and conclusions for some of their laboratory sessions.
Mentored work	The students will have to write an individual report about one subject related to Chemical Engineering. The teacher will indicate them the main points of the subject that they will have to develop and the recommended literature.

Personalized assistance			
Methodologies Description			
Problem solving	In the assigned hours of tutoring the professor will solve any doubts regarding the subject		
Autonomous problem solving In the assigned hours of tutoring the professor will solve any doubts regarding the subject			
Mentored work	In the assigned hours of tutoring the professor will solve any doubts regarding the subject		

Assessment				
	Description	Qualification	Lea	iing and arning esults
Laboratory practical	The qualification will depend on the laboratory work and the laboratory report made by the students. Laboratory sessions are mandatory.	10	C21 C22 C23 C25 C27 C28 C29	D1 D6 D8 D10 D12 D13 D14 D15
Autonomous problem solving	The students will have to deliver, in the terms indicated, the problems proposed of each subject.	5	C1 C16 C19 C22	D3 D7 D9
Presentation	The students will make an oral presentation related to laboratory work.	5	C16 C20 C23	D4 D5 D7 D8 D14
Mentored work	The students will realise, and will deliver in the date indicated, an individual work on a subject proposed to the start of course.	5	C1 C16 C20 C23	D1 D14
Problem and/or exercise solving	They will realise two short exams, one about the subjects 1 and 2 and another one about the subjects 3 and 4.	20	C1 C16 C19	D1 D6 D7 D9
Essay questions exam	At the end of the course the students have to do an exam related to all the subjets.	55	C1 C16 C19	D1 D6 D7 D9

Other comments on the Evaluation

Short and long exams. They will realise two short exams along the term. In the final exam, all topics will be evaluated and it is necessary to reach a minimum of 3 out of 10 points to take into account the other elements of evaluation. In case of not reaching the minimum note, the final qualification will be the one obtained in the long exam. Laboratory sessions. The laboratory sessions (lab work and report) and the oral presentation are mandatory and they are 15% of the final qualification. It is indispensable to have a minimum grade of 5 out of 10 points in this section. 50% or more laboratory sessions non-attendance means not to pass the course, independently of the results obtained in the other elements of evaluation. The participation of the student in any of the exams (short exams and long exam), two or more laboratory sessions or the delivery of 20% or more of the works required by the professor, involves the condition of "presented" and the obtention of a qualification. June final exam. A long exam of all the matter that will suppose 75% of the qualification will be

done. The students will keep the grades of obtained in laboratory sessions, oral presentation, autonomus exercices and tutored work obtained along the course.

Sources of information

Basic Bibliography

Calleja y otros, Introducción a la Ingeniería Química, Síntesis, 1999

W.L. McCabe, J.C. Smith y P. Harriot, **Operaciones unitarias en Ingeniería Química**, McGraw-Hill, 2007

Complementary Bibliography

R.M. Felder, **Principios elementales de los procesos químicos**, Limusa Wiley, 2003

C.J. Geankoplis, **Procesos de transporte y principios de procesos de separación**, Grupo editorial patria. México, 2007 José Felipe Izquierdo y otros, **Introducción a la Ingeniería Química. Problemas resueltos de balances de materia y energía**, Reverté, 2015

Recommendations

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 establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or no totally face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a way but agile and effective when being known in advance by the students and the faculty through the tool normalised and institutionalised of the educational guides DOCNET.

=== ADAPTATION OF The METHODOLOGIES ===

- * educational Methodologies that keep . All
- * educational Methodologies that modify Any

The educational methodologies will give , to be necessary, adapting them to the telematic means that put the disposal of the teacher , in addition to the documentation facilitated through FAITIC and other platforms, email, etc.

When it was not possible to face-to-face teaching, in the measure of the possible, will prevail teaching of the theoretical contents by telematic as well as those contents of practices of resolution of problems, and others, that can be online or developed by the students of way guided, tried keep the classroom-based approach for the experimental practices of laboratory, whenever the groups fulfil with the rule established in the moment by the pertinent authorities in sanitary matter and of security. In the case of not being able to be given of face-to-face form, those contents will give online or will be supplied by other (autonomous work guided, etc.) that allow to achieve equally the competitions associated to them.

* Mechanism no face-to-face of attention to the students (tutoring) The tutoring will develop of telematic form respecting or adapting the schedules of tutoring planned.

- * Modifications (proceed) of the contents to give- **Ningun
- * additional Bibliography to facilitate to car-learning- **Ningun
- * Other modifications

...

=== ADAPTATION OF The EVALUATION === * Test already made- will be supported by the **memos weights Tests *XX: [previous Weight 00%] [Weight Proposed 00%] ...

* Pending proofs that keep - all Proof *XX: [previous Weight 00%] [Weight Proposed 00%] * Proofs that modify -- Any

[previous Proof] =&*amp;**gt; [new Proof]

* New proofs- any

* additional Information: The proofs will develop of face-to-face form, adapting them to the valid sanitary rule, except Resolution *Rectoral that indicate that they have to do of form no face-to-face, making gave way through the distinct tools put the disposal of the faculty. Those no attainable proofs of telematic form will be supplied by other (deliveries of autonomous work guided, etc.)