29928 - Chemical Engineering Experiments I

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Year	3
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process that has been designed for this subject is based on the following:

In each laboratory session, students will work in groups of two or three people. The students will know in advance the lab work to be performed and must have read its script before the session.

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Once in the laboratory, students will conduct the experimental work assigned. They will discuss the results and write one or more reports covering the work done (results, calculations, graphical representations...), with a proper presentation.

Finally, students must make an individual written exam that aims to demonstrate the knowledge acquired on the subject.

5.2.Learning tasks

The program offered to students includes the following activities:

A 1 hour lecture in the classroom or laboratory, where the teacher explains to all groups the theoretical concepts corresponding to practice 9 of the Chemical Engineering Department (see paragraph 5.3).

Laboratory sessions : 21 practices distributed as follows: (I) Knowledge Area of Chemical Engineering (4 ECTS): 13 sessions of 3 hours, (II) Knowledge Area of Thermal Systems (1 ECTS): 4 sessions of 2.5 hours. (III) Knowledge Area of Fluid Mechanics (1 ECTS): 4 sessions of 2.5 hours.

5.3.Syllabus

The sessions program can be grouped according to the area, as follows:

I) Knowledge Area of Chemical Engineering (4 ECTS): 13 sessions of 3 hours. Some sessions may change depending on the availability or proper functioning of the required equipment

Session 1. Kinetics of a catalyzed homogeneous reaction

Session 2. Kinetics of a homogeneous reaction in a continuous reactor

Session 3. Kinetics of an enzymatic reaction

Session 4. Absorption with chemical reaction

Session 5. Determination of the equilibrium curve and differential distillation

Session 6. Ion exchange

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Session 7. Continuous stirred-tank and plug flow reactors (CSTR and PFR)

Session 8. Leaching

Session 9. Fluidization. Determination of fixed bed porosity and calculation of minimum fluidization velocity

Session 10. Distillation with reflux

Session 11. Continuous stirred-tank battery

Session 12. Adsorption isotherm

Session 13. Permeation of gas through porous membranes

(II) Knowledge Area of Thermal Systems (1 ECTS): There will be 4 sessions of 2.5 hours each. Practices will be the following:

Session 1. Thermal efficiency of a boiler.

Session 2. Evaluation of the performance of an evaporative cooler

Session 3. Internal combustion engines

Session 4. Thermal turbomachinery

(III) Knowledge Area of Fluid Mechanics (1 ECTS): 4 sessions of 2.5 hours each will be held.

Session 1. Disassembling and selection of pumps

Session 2. Pump testing and cavitation

Session 3. Pressure losses in systems. Valve characterization.

Session 4. Fan testing

5.4.Course planning and calendar

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Sessions and presentations scheduling

Laboratory sessions are given following the schedule established by the Centre before the beginning of the current academic year (available in http:\\eina.unizar.es). They will be planned according to the number of students and will be announced in advance. Every teacher will inform the students about individual tutorial schedule. In addition to the recommended bibliography, the set of scripts of the laboratory sessions will be available at the EINA copy service

5.5.Bibliography and recommended resources

BB	Baker, Roger C. Flow measurement handbook : Industrial designs, operating principles, performance, and applications / Roger C. Baker . - 1st pub. Cambridge [etc.] : Cambridge Univeristy Press, 2000
BB	Boilers, evaporators and condensers / Edited by Sadik Kakaç New York [etc.] : John Wiley and Sons, cop.1991
BB	Cinética química aplicada / Juan Ramón González Velasco...[et al.] Madrid : Síntesis, D.L. 1999
BB	Giacosa, Dante. Motores endotérmicos : motores de encendido por chispa, de carburación y de inyección, motores de encendido por compresión Diesel, lentos y veloces, motores rotativos, turbinas de gas, teoría, construcción, pruebas / Dante Giacosa Barcelona : Omega, D.L.1988
BB	Ingeniería de reactores / Jesús Santamaría ... [et al.] . - [1ª ed.], 1ª reimp. Madrid : Síntesis, D. L. 2002
BB	Levenspiel, Octave. Chemical reaction engineering / Octave Levenspiel . - 3rd ed. New York [etc.] : John Wiley & Sons, cop. 1999
BB	Levenspiel, Octave. Ingeniería de las reacciones químicas / Octave Levenspiel ; [con la colaboración en la traducción de Juan A. Conesa ; revisión técnica, Enrique Arriola Guevara] . - 3ª ed. México : Limusa Wiley, cop. 2004
BB	Mataix, Claudio. Turbomáquinas hidráulicas : turbinas hidráulicas, bombas, ventiladores / Claudio Mataix . - 2ª ed. rev. y corr. / Por Antonio Arenas ; con la colaboración de Eva Arenas y Alexis Cantizano Madrid : Universidad Pontificia de Comillas 2009
BB	McCabe, Warren L.. Unit operations of chemical engineering / Warren L. McCabe, Julian C. Smith, Pvoeter Harriott . - 6th. ed. Boston [etc] : McGraw-Hill, 2001
BB	Muñoz Rodríguez, Mariano. Motores alternativos de combustión interna /

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	Mariano Muñoz Rodríguez, Francisco Moreno Gómez, Jesús F. Morea Roy Zaragoza : Prensas Universitarias de Zaragoza, 1999
BB	Seader, J. D.. Separation process principles / J. D. Seader, Ernest J. Henley . - 2nd ed. Hoboken, NJ : John Wiley & Sons, cop. 2006
BB	Treybal, Robert E. Operaciones de transferencia de masa / Robert E. Treybal ; tradución Amelia García Rodríguez, revisión técnica Francisco José Lozano . - 2a ed. [reimp.] México [etc] : McGraw-Hill, 1994
BB	Turbomáquinas térmicas / Mariano Muñoz Rodriguez, Francisco J. Collado Giménez, Francisco Moreno Gómez, Jesús F. Morea Roy . - 1a ed. Zaragoza : Prensas Universitarias, 1999
BB	Turbopumps and pumping systems / Ahmad Nourbakhsh ... [et al.] Brelin [etc.] : Springer, cop. 2008