29932 - Chemical Engineering Experiments II

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Course	4
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process that is designed for this course is based on the following:

In each one of the sessions, students will work in groups of two. Students will know in advance the practice to make and must have read the script. For the part of computer simulation, if schedules and availability of computer equipment allows it, practices will be held individually.

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In each practice session, students will perform the experimental part. During the practice session the teacher will pose questions related with the theory of the practice being performed.

5.2.Learning activities

The following activities are programmed:

Theory: one theory class with a duration of 1 hour, in which the basics and the evaluation of the course will be exposed.

Laboratory classes: about 20 practices distributed as follows:

I) Practices of simulation of chemical processes with computer: 9

II) Practices of control of chemical processes: 9

III) Chemical reactions engineering laboratory: 2

Alternatively, and depending on availability, some practices could be replaced (up to three) for visits to industries.

5.3.Program

One theory class with a duration of 1 hour, in which the foundations of the subject and the evaluation of the subject will be exposed.

About 20 practices distributed as follows:

I) Practices of simulation of chemical processes with computer: up to 9 sessions of three hours each, using the chemical process simulator Aspen HYSYS®. An example of practices that can be performed is shown below:

* Practice 1. Introduction to Hysys. Binary rectification

* Practice 2. Extractive Distillation

* Practice 3. Synthesis of MTBE

* Practice 4. Synthesis of toluene

* Practice 5. Production of ethylene glycol

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* Practice 6. Production of ethylene oxide

* Practice 7. Production of ethyl chloride

* Practice 8. Gasification and Combined Cycle

* Practice 9. Separation of monochlorobenzene

II) Practices of control of chemical processes: up to 9 sessions of three hours each. An example of practices that can be performed is shown below:

* Practice 1. Processes of first order

* Practice 2. Tuning PID controllers (I): level in a tank

* Practice 3. Control of pressure and flow in a gas stream

* Practice 4. Control of temperature in a reactor

* Practice 5. Tuning PID controllers (II): cooled reactor

* Practice 6. Process second order

* Practice 7. Characterization of the behavior of temperature sensors

* Practice 8. Control of pH

* Practice 9. Level control in a tank

III) Practices of chemical reactions engineering: 2 sessions of 3-hour each, for instance:

* Practice 1. Deactivation of catalysts: dehydrogenation of ethane

* Practice 2. Real Flow. Tank-pipe system

Alternatively, and depending on availability, some practices could be replaced (up to three) by visits to industries. In that case, it will be announced in advance the replaced practices. This activity would have a maximum duration of 9 hours in total.

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5.4.Planning and scheduling

The practice sessions are held in the laboratory according to schedule established by the School of Engineering and Architecture (EINA) and it will be published prior to the start date of the course (timetables available at http: \\ eina.unizar.es).

They will be planned depending on the number of students and will be announced previously to the beginning of the course.

Each teacher will inform of his hours of tutoring.

5.5.Bibliography and recomended resources

BB	Austin, George T.. Shreve's chemical process industries / George T. Austin . - 5th ed. New York [etc.] : McGraw-Hill, cop. 1984
BB	Bequette, B. Wayne. Process control : modeling, design, and simulation / Wayne B. Bequette . Upper Saddle River (New Jersey) : Prentice Hall PTR, cop. 2003
BB	Berg, Pieter J. Van Den. Introduction to chemical process technology / P.J. Van Den Berg and W.A. de Jong Delft : Delft University Press ; Dordrecht : Reidel Publishing, cop. 1980
BB	Creus Solé, Antonio. Instrumentación industrial / Antonio Creus Solé . 8ª ed. Barcelona : Marcombo, 2011
BB	Luyben, William L.. Plantwide process control / William L. Luyben, Björn D. Tyréus, Michael L. Luyben . New York [etc.] : McGraw-Hill, cop. 1999
BB	Moulijn, Jacob. A.. Chemical process technology / Jacob A. Moulijn, Michiel Makkee, Annelies van Diepen Chichester [etc.] : John Wiley, cop. 2001
BB	Process dynamics and control / Dale E. Seborg ... [et al.] . - 3rd ed., international student ed. Hoboken, NJ : Wiley, cop. 2011
BB	Product and process design principles : synthesis, analysis, and evaluation / Warren D. Seider ... [et al.] . 3rd ed. Hoboken [New Jersey] : John Wiley and Sons, cop. 2010
BB	Vian Ortuño, Angel. Introducción a la química industrial / Angel Vian Ortuño . - 2ª ed., [reimpr.] Barcelona [etc.] : Reverté, D. L.1999