

27216 - Fundamentals of Chemical Engineering

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	452 - Degree in Chemistry
ECTS	6.0
Course	3
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

5.2. Learning activities

5.3. Program

The course is divided in two sections. The following syllabus is intended to help the student the consecution of his/her formative training throughout the following activities:

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Section 1: Introduction. Mass and energy balances in steady state.

	Hours present	Activity
1.9 ECTS	9 h	Master class (theoretical classes and exercises)
	10 h	Exercises

The 9 h of master classes will include:

- Chemical Engineering Introduction
- Nomenclature and unit systems; dimensional analysis; units conversion.
- Mass and energy balances in steady state in chemical processes.
- Mass balances in steady state with and without chemical reaction.
- Simultaneous resolution of mass and energy balances in steady state.

Section 2: Transport phenomena. Unit Operations and Processes. Reactor Design.

	Hours present	Activity
4.1 ECTS	21 h	Master class (theoretical classes and exercises)
	8 h	Exercises
	12 h	Lab practices (2 people groups)

The 21 h of master classes will include:

- Introduction to Transport Phenomena
- Transport mechanisms. Transport equations in laminar flow regime. The boundary layer.
- Individual and global transport coefficients.
- Heat exchanger design
- Fundamentals of separation processes. Distillation

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- Design of absorption and stripping towers.
- Reactor design. Chemical reaction kinetics.
- Discontinuous reactors
- The continuous plug flow reactor model
- The continuous flow stirred-tank reactor

12 h of laboratory practices will be distributed as follows :

Each couple will carry out 4 laboratory practices, two related to Section 1 (laboratory practices 1a to 4a) and two related to section 2 (laboratory practices 1b and 2b).

Each laboratory practice will last 2,5h. Each couple will carry out 2 practices from the 4 included in Section 1:

Practice 1a: Gas/liquid absorption/desorption. Determination of individual mass transport coefficients.

Practice 2a: Ion exchange. Determination of the breakthrough curve.

Practice 3a: Extraction solid/liquid. Analysis of the contact mode, temperature and number of stages.

Practice 4a: Discontinuous distillation.

Each couple will carry out the two following laboratory practices related to section 2 of the syllabus.

Practice 1b: continuous plug flow reactor model. Influence of the reaction conditions on the conversion.

Practice 2b: The continuous flow stirred-tank reactor. Reactors in series.

5.4.Planning and scheduling

5.5.Bibliography and recommended resources

BB	Introducción a la ingeniería química / Editor Guillermo Calleja Pardo ; Autores Guillermo Calleja Pardo...[et al.] Madrid : Síntesis, D.L. 1999
BC	Felder, Richard M.. Principios elementales de los procesos químicos / Richard M.Felder, Ronald W. Rousseau ; [colaboradora en la traducción, María Teresa Aguilar Ortega de Sandoval ; revisión, Enrique Arriola Guevara] . - 3ª ed. México [etc.] : Limusa Wiley, cop. 2003
BC	Himmelblau, David M.. Principios básicos y

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cálculos en ingeniería química / David M. Himmelblau ; traducción, Roberto Luis Escalona García ; revisión técnica, M^a del Carmen Doria Serrano . - 2^a ed. en español México [etc.] : Prentice-Hall Hispanoamericana, cop. 1997

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Ingeniería de reactores / Jesús Santamaría ... [et al.] Madrid : Síntesis, D.L. 1999

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McCabe, Warren L.. Operaciones unitarias en ingeniería química / Warren L. McCabe, Julian C. Smith, Peter Harriott ; traducción, María Aurora Lanto Arriola; revisión técnica, María Teresa Collí Serrano, Anselmo Osorio Mirón . - 6^a ed. México [etc.] : McGraw-Hill, cop. 2002

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Ruiz Palacín, Joaquín. Problemas resueltos de balances de materia en estado estacionario / Joaquín Ruiz Palacín Zaragoza : Prensas Universitarias de Zaragoza, 2009