29922 - Applied Kinetic Chemistry

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	3
Period	Half-yearly
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

For the design of the learning process, it was considered that this is a theoretical-practical subject. This implies continued study of theoretical aspects and their subsequent application to the resolution of issues and problems of particular interest to allow the students to assimilate the contents of the subject.

The teaching method includes explanatory slides containing the most important theoretical and practical aspects of the discipline. Numerous schemes and examples that allow easy assimilation and application of the most important concepts are provided. It also offers a collection of exercises and questions whose resolution will offer the student a tool for self-evaluation. This material is accompanied by a set of references for consultation and deepening.

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5.2.Learning activities

The subject "Applied chemical kinetics" requires a dedication by students of about 150 h, equivalent to 6 ECTS. The learning process is based on the following schedule of teaching and learning activities

- Participative theoretical lectures (40 h)
- Questions and exercises sessions (20 h)
- Programmed works in small student groups, supervised by the teacher (20 h)
- Personal study (64 h)
- Assessment tests (6 h)
- Individual tutorials throughout the course

The Reprography Service of EINA makes available to students the photocopies of slides, questions and exercises that include all the lessons of the course. In addition, all this is accessible on the platform ADDUnizar.

5.3.Program

Block 1. Introduction.
Lesson 1. Basics of Applied Chemical Kinetics.

Block 2. Kinetics of homogeneous reactions.
Lesson 2. Homogeneous reactions: Kinetic equation. Elementary and non-elementary reactions. Reaction mechanisms. Dependence of the reaction rate on concentration and temperature. Activation energy. Arrhenius approach. The reaction rate from kinetic theories.
Lesson 3. Interpretation of kinetic data obtained in laboratory reactors: Batch and continuous reactors.
Lesson 4. Method differential of kinetic data analysis.
Lesson 5. Integral method of kinetic data analysis.
Lesson 6. Homogeneous catalysis.

Block 3. Kinetics of heterogeneous reactions.
Lesson 7. Introduction to kinetic study of heterogeneous reactions.

Lesson 8. Heterogeneous catalytic reactions. Solid catalysts. General concepts of catalysis and adsorption. Obtaining experimental of kinetic data on gas / solid catalytic reactions.
Lesson 9. Kinetics and mechanism of reactions on solid catalysts.
Lesson 10. Kinetics of deactivation of catalysts.

Block 4. Kinetics of the enzymatic reactions.

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Lesson 11. Enzymatic reactions: Enzymes. Homogeneous enzyme kinetics. Michaelis-Menten kinetics. Determination of kinetic constants. Enzymatic inhibition.

5.4.Planning and scheduling

	Theoretical lectures and model exercises	Questions and exercises sessions	Programmed works
Block 1. Introduction			
Lesson 1	2	0	
Block 2. Kinetics of homogeneous reactions			
Lesson 2	4	2	Work 1
Lesson 3	2		
Lesson 4	2	2	
Lesson 5	8	4	Work 2
Lesson 6	2	1	
First partial exam (3 h)			
Block 3. Kinetics of heterogeneous reactions			
Lesson 7	2	1	
Lesson 8	8	4	
Lesson 9	3	2	Work 3
Lesson 10	4	2	
Block 4. Kinetics of the enzymatic			

reactions Lesson 11	3	2	Work 4
Total student hours	40	20	20
Second partial exam (3 h)			

Theoretical and exercise lectures are given following the schedule established by EINA before the beginning of the current academy course. Every teacher will inform the students about individual tutorial schedule. Other activities will be planned as a function of the number of students early enough.

5.5.Bibliography and recomended resources

BB	Cinética química aplicada / Juan Ramón González Velasco...[et al.] Madrid : Síntesis, D.L. 1999
BB	H. Scott Fogler. Elementos de ingeniería de las reacciones químicas / H. Scott Fogler ; traducción, María Teresa Aguilar Ortega ; revisión técnica, Román Ramírez López ... [et al.] . - 4ª ed. Naucalpan de Juarez, México : Pearson Educación, 2008
BB	Levenspiel, Octave. Ingeniería de las reacciones químicas / Octave Levenspiel ; [versión española por Juan A. Conesa] . - 3ª ed. México D. F. : Limusa Wiley, 2004
BB	Pérez Báez, Sebastián O.. Problemas y cuestiones en ingeniería de las reacciones químicas / Sebastián O. Pérez Báez, Antonio Gómez Gotor . - 1a ed. Madrid : Bellisco, 1998
BB	Smith, Joe Mauk. Chemical engineering kinetics / J.M. Smith . - 3rd. ed. Auckland [etc.] : McGraw-Hill, 1981
BC	Cinética de las reacciones químicas / José Felipe Izquierdo ... [et al.] Barcelona : Universitat de Barcelona, D.L. 2004
BC	Froment, Gilbert F. Chemical reactor analysis and design / Gilbert F. Froment, Kenneth B. Bischoff . - 2nd. ed. New York [etc.] : John Wiley, cop. 1990
BC	Levenspiel, Octave. El omnilibro de los reactores químicos / O. Levenspiel ; [versión española por J. Costa López y L. Puigjaner Corbella] . - [1ª ed.], 1ª reimp. Barcelona [etc.] : Reverté, 2002
BC	Problemas resueltos de cinética de las reacciones químicas / José Felipe Izquierdo ... [et al.] Barcelona : Universitat de Barcelona, D.L. 2004

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