

29921 - Matter Transfer

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	330 - Complementos de formación Máster/Doctorado 435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Year	XX
Semester	Half-yearly
Subject Type	Compulsory, ENG/Complementos de Formación
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 process learning is based on:

- Participative lectures
- Classes of problems
- Supervised works in small student groups

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- Individual tutorials

5.2. Learning tasks

- **Participative Lectures (40 h)** : Theoretical lectures with the resolution of exercises and questions in classroom.
- **Classes of problems (20 h)** : Students solve problems by himself in the classroom under the supervision of the teacher.
- **Supervised works in small student groups (12 h)** : Students form groups of two people. Every group solves two problems proposed by the teacher and one problem proposed by the group. The three works are evaluated with feedback for the students.
- **Individual study (72 h)** . Continuous study by the student is recommended.

5.3. Syllabus

Lesson 1: Fundamentals of mass transfer. Diffusion and Convection

Section 1. Diffusion

Lesson 2: Stationary State Diffusion

Lesson 3: Non-stationary state Diffusion

Lesson 4: Diffusion coefficients estimation

Section 2: Diffusion and Convection

Lesson 5: Diffusion in concentrated solutions

Section 3: Mass transfer across interfaces

Lesson 6: Mass transfer models. Individual mass transfer coefficients

Lesson 7: Mass transfer across fluid-fluid interface. Global mass transfer coefficients.

Section 4: Heterogeneous Chemical Reactions

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Lesson 8: Fluid-Fluid reactions

Lesson 9: Non-catalytic Solid-Fluid reactions

5.4.Course planning and calendar

Theoretical and problems 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.

	Theoretical + Problems Lectures	Deliverables	Individual Study
Lesson 1. Fundamentals	4 h + 1 h		2 h
Lesson 2. Stationary state diffusion	8 h + 3 h	Delivarable 1 (4 h)	15 h
Lesson 4. Non-stationary state diffusion	6 h + 2 h		10 h
Lesson 4. Diffusion Coefficients Estimation	1 h + 1 h		2 h
Lesson 5. Diffusion in concentrated solutions	4 h + 3 h	Deliverable 2 (4 h)	8 h
Lesson 6. Mass transfer models. Individual mass transfer coefficients	2 h + 2 h		5 h
Lesson 7. Mass Transfer across fluid-fluid interface. Global mass transfer coefficients	5 h + 4 h	Deliverable 3 (4 h)	10 h
Lesson 8. Fluid-Fluid	5 h + 2 h		10 h

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Reactions			
Lesson 9. Non-catalytic Solid-Fluid Reactions	5 h + 2 h		10 h
Total hours	40 h + 20 h	12 h	72 h

Duration of lessons are estimation

5.5. Bibliography and recommended resources

- 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** Lobo Oehmichen, Ricardo. Principios de transferencia de masa / Ricardo Lobo Oehmichen México : Universidad autónoma metropolitana, unidad iztapalapa, 1997
- BB** Téllez Ariso, Carlos. Problemas de transferencia de materia / Carlos Téllez Ariso y Jesús Arauzo Pérez . - 1ª ed. Zaragoza : Prensas Universitarias de Zaragoza, 2008
- BC** Basmadjian, Diran. Mass transfer : principles and applications / Diran Basmadjian . - 2nd ed. Boca Raton [Florida] : CRC Press, cop. 2007
- BC** Bird, R. Byron. Fenómenos de transporte : un estudio sistemático de los fundamentos del transporte de materia, energía y cantidad de movimiento / R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot . - [1ª ed., reimp.] Barcelona ; México : Reverté, cop. 2001
- BC** Bird, R. Byron. Transport phenomena / R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot . - 2nd ed. New York [etc.] : John Wiley, cop. 2002
- BC** Cussler, E. L.. Diffusion mass transfer in fluid systems / E. L. Cussler . - 2nd ed., 7th. print. Cambridge [etc.] : Cambridge University Press, 2005
- BC** Hines, Anthony L. Transferencia de masa : fundamentos y aplicaciones / Anthony L.

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- Hines, Robert N. Maddox ; traducción José Luis Rodríguez Huerta ; revisión técnica Ramiro Eugenio Domínguez Denache . - [1ª ed. en español] México [etc.] : Prentice-Hall Hispanoamerica, 1987
- BC** Ingeniería de reactores / Jesús Santamaría ... [et al.] . - [1ª ed.], 1ª reimp. Madrid : Síntesis, D. L. 2002
- 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** Treybal, Robert E.. Operaciones de transferencia de masa / Robert E. Treybal ; traducción Amelia García Rodríguez, revisión técnica Francisco José Lozano . - 2a ed. [reimp.] México [etc] : McGraw-Hill, 1994