

29921 - Mass Transfer

Syllabus Information

Academic year: 2023/24

Subject: 29921 - Mass Transfer

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: 435 - Bachelor's Degree in Chemical Engineering: 3

330 - Complementos de formación Máster/Doctorado: XX

Semester: First semester

Subject type: 435 - Compulsory

330 - ENG/Complementos de Formación

Module:

1. General information

It is intended that the student understands and applies the principles that govern the processes of matter transfer to the solution of problems, in order to serve as a basis for the design of equipment, operations and processes where it takes place the design of equipment, operations and processes where this transport phenomenon.

This goal is aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in particular, the learning activities foreseen in this subject will contribute to the achievement of objective 6.3 of goal 6, objective 9.4 of goal 9 and objective 12.4 and 12.5 of goal 12.

2. Learning results

1. Identify, evaluate and analyze the matter transfer processes involved in a given physical situation involved.
2. Estimate diffusion coefficients and matter transfer coefficients in typical situations of the chemical industry.
3. Master the numerical resolution that allows to determine the rate of matter transfer in processes based on mass transfer and in processes in which the transfer is coupled to chemical reactions.
4. Analyze the effect of the operating variables of a process on the rate of matter transfer.
5. Preliminary dimensioning of absorption equipment.

3. Syllabus

Topic 1: Introduction to matter transfer. Diffusion and Convection

Block 1: Broadcast

Unit 2: Matter transfer by steady-state diffusion

Unit 3: Matter transfer by diffusion in non-steady state

Unit 4: Diffusion and natural convection

Unit 5: Estimation of diffusion coefficients

Block 2: Matter transfer between phases

Unit 6: Models of the transfer of matter from the interface to the interior of a fluid.

Unit 7: Estimation of individual matter transfer coefficients

Unit 8: Transfer of matter between fluids. Overall mass transfer coefficient

Block 3: Reactions in heterogeneous systems

Unit 9: Fluid-fluid reactions

Unit 10: Non-catalytic solid-gas reactions

4. Academic activities

Lectures (40 h) where the theory of the different topics will be taught and model problems will be solved.

Problem solving classes and cases (20 h). In these classes, the student will solve problems by supervised by the teacher.

Tutored work (24 h) in groups. Groups of two people will be formed and throughout the semester activities will be proposed which will be supervised by the teachers.

Individual study (60 h). It is recommended that the student carry out individual study on an on-going basis throughout the semester.

Assessment(6 h). It is estimated that 6 hours of assessment are necessary, including partial and global test.

Students have access to the teacher in personalized and group tutorials to resolve any doubts that may arise.

5. Assessment system

1st Call: One of the following options may be chosen

Option 1: This option includes:

1.-**Tutorial** work (15 % of the final grade): Delivery throughout the semester of several problems.

2.-First **midterm exam** (42.5% of the final grade). Written test consisting of theoretical questions and problems. A minimum score of 4.0 is required to average theory questions and problems.

3.-Second midterm **exam** (42.5% of the final grade). Written test of similar characteristics to the first midterm exam.

In this option 1, a minimum midterm score of 4.5 is required to average with the other midterm.

Option 2: Global written test with similar characteristics to the midterm exams. In the case of not having submitted tutored work, the term grade will be 100% of the final grade. If papers are submitted, their grade may constitute 15% of the final grade, but a minimum score of 4.5 on the written test will be required for averaging.

2nd Call for applications: Students may only be assessed according to option 2 detailed in the 1st call.