

## 29921 - Mass Transfer

### Syllabus Information

**Academic year:** 2024/25

**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.

### 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: Steady-state mass transfer without chemical reaction**

**Unit 2:** Introduction

**Unit 3:** Diffusion

**Unit 4:** Diffusion and natural convection

**Unit 5:** Convection. Overall mass transfer coefficient

**Unit 6:** Estimation of diffusion and mass transfer coefficients

**Block 2: Unsteady state mass transfer without chemical reaction**

**Unit 7:** Pseudo\_unsteady state

**Unit 8:** Semi-Infinite Medium

**Unit 9:** Transfer of matter between fluids. Overall mass transfer coefficient

**Block 3: Reactions in heterogeneous systems**

**Unit 10:** Fluid-fluid reactions

**Unit 11:** 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.

#### 6. Sustainable Development Goals

6 - Clean Water and Sanitation

9 - Industry, Innovation and Infrastructure

12 - Responsible Production and Consumption