PERSONA CIÈNCIA EMPRESA
UNIVERSITAT RAMON LLULL

COURSE: UNIT OPERATIONS OF ENGINEERING II

SUBJECT MATTER: Fundamentals of Thermal and Fluids Engineering
MODULE: Core Topics of Industrial Engineering
PROGRAM: Degree in Chemical Engineering

GENERAL CHARACTERISTICS

Type: ☐ Basic Formation, ☑ Compulsory, ☐ Elective
☐ Final Degree Project, ☐ Internship

Duration: Semestral **Semester/s**: 5
Number of ECTS credits: 6
Language/s: Spanish, Catalan

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION

The basic operations of chemical processes are the pieces that allow you to perform various processes in the industry.

This subject transport models of matter and heat are presented. Transport models subject apply to separation operations such as gas absorption and heat transport models apply to the calculation of equipment called heat exchangers.

COMPETENCES

- To be able to understand and apply knowledge of Chemistry and Engineering for its application in the field of Chemical Engineering. (CB1, E2).
- Be able to use systems, components or processes to achieve the requirements established in the activity to be carried out in the field of Chemical Engineering. (CB2, E6).
- Be able to identify, formulate and solve problems in the fields of Chemical Engineering and Chemistry. (CB2, E7).
- Knowledge of applied thermodynamics and heat transmission. Basic principles and their application to engineering problem solving. (CRI1).

PREREQUISITES

According to current academic teaching planning and regulations.

CONTENTS

1. Mass transfer.
    - Separation operations modelled by differential continuous contact.
        - Molecular diffusion.
        - Transfer coefficient concept.
        - Calculations of separation column filler.
        - Height equivalent theoretical plate filler.
        - Examples of separation operations.
2. Heat transfer.
    - Heat transport mechanisms:
        - Driving.
        - Convection.
        - Radiation.
    - Extended surfaces: fins.
    - Design of heat exchangers.

METODOLOGY

LEARNING ACTIVITIES

Learning activities	Hours	ECTS Credits	Competences
Lectures	38	1,4	CB1, E2, CRI1
Case and Problem-Solving Sessions	22	0,8	CB1, E2, CB2, E7, CRI1
Seminars	3	0,1	CB1, E2, CB2, E7, CRI1
Practical & Lab Work		--	--
Presentations			
Personal study	92	3.4	CB1, E2, CB2, E7, E6, CRI1
Assessment Tasks (Exams, Continuous Assessment...)	8	0,3	CB1, E2, CB2, E7, E6, CRI1
TOTAL	**163**	**6.0**	

TEACHING METHODOLOGY

The teaching methodology of the course is based on combining a dynamic exhibition (presentation of content) with a demonstrative dynamics (the professor shows how to solve problems), followed by an active and dynamic (the student solves problems that the professor corrects a posteriori). And the active participation of students is encouraged and the acquisition of knowledge and practice in problem solving is facilitated.

The teaching methodology of the course is based on the availability of laptops by students. For staff student study the documents relating to the sessions, collections and library resources problems are given.

ASSESSMENT

ASSESSMENT METHODS

Assessment Methods	Weight	Competencies
Final Exam	45%	CB1, E2, CB2, E7, CRI1
Midterm Exam/s	--	--
Follow-up Activities	50%	CB2, E7, E6, CRI1
Reports and Presentations		
Lab or Field Work	--	--
Projects	--	--
Host Student Evaluation	--	--
Participation	5%	CB2, E6, CRI1

LEARNING OUTCOMES

- The student must demonstrate basic knowledge of diffusional mass transport (CB1, E2).
- The student must demonstrate basic knowledge of heat transport (CB1, E2).
- The student must demonstrate proficiency in identifying, formulating and solving simple problems in the field of basic operations based on diffusional transport of matter (CB2, E7).
- The student must demonstrate proficiency in identifying, formulating and solving simple problems in the field of basic operations based on heat transport (CB2, E7).
- The student must demonstrate ability to use systems, components or processes to achieve the requirements of the activity performed (CB2, E6).

QUALIFICATION

The final grade for the course will consider the qualifications obtained by the student in the final examination (EF) Follow-up (AS) and participation (P).

All ratings are expressed on a scale of 0 to 10.

EF final exam will consist of two parts: assessment 30% 70% knowledge and problem-solving.

AS monitoring activities consist of partial controls of matter in which the resolution of a problem will be assessed, will take place at the scheduled time and classroom for teaching the subject. AS grade will be the arithmetic mean of all performed.

P participation will be evaluated by monitoring student attendance at scheduled times of the subject. The maximum grade (10 points) is obtained attending all.

The final grade of the subject in all the official announcements of the subject is calculated: 0.45 + 0.50 EF 0.05 + AS P.

The student must obtain, in the first official announcement of Final Exam (EF) which is present, a minimum of 4 points out of 10 to be eligible to pass the course (minimum of 5 out of 10 in the final grade). Failure to reach the minimum required in the Final Exam is entered as a final grade for the course in the first official call by the student, the grade obtained in the Final Exam (EF).

ASSESSMENT OF THE COMPETENCES

The assessment of competencies is obtained:

CB1, E2: corresponds to the rating section of knowledge obtained in the final exam.

CB2, E7: is the arithmetic average rating troubleshooting section of the final examination and monitoring activities.

E6: is the arithmetic mean score of monitoring and participation.

CRI1: corresponds to the final grade for the course.

BIBLIOGRAPHY

- WL McCabe, JC Smith, P. Harriott, Unit operations in chemical engineering, McGraw-Hill, 7th ed., Mexico 2007.
- Inkropera FP, DP DeWitt, TL Bergman and AS Lavine, Introduction to Heat Transfer, John Wiley & Sons, 5th ed., New Jersey 2007.
- DW Green and RH Perry, Chemical Engineers' Handbook, 8th ed., McGraw-Hill, New York 2007.

DOCUMENT HISTORY

PREVIOUS REVISIONS

September 12, 2017, Dr Maria Luisa Espasa Sempere
July 18, 2016, Dr Maria Luisa Espasa Sempere
July 14, 2015, Dr Maria Luisa Espasa Sempere
July 8, 2013, Dr Maria Luisa Espasa Sempere
August 14, 2012, Dr Maria Luisa Espasa Sempere
September 11, 2011, Dr Maria Luisa Espasa Sempere
July 13, 2011, Dr Maria Luisa Espasa Sempere

CURRENT REVISION

July 24, 2018, Dr Maria Luisa Espasa Sempere