SUBJECT TEACHING GUIDE

G716 - Industrial Chemistry

Degree in Industrial Technologies Engineering

Academic year 2022-2023

1. IDENTIFYING DATA				
Degree	Degree in Industrial Technologies Engineering		Type and Year	Compulsory. Year 4
Faculty	School of Industrial Engineering and Telecommunications			
Discipline	Subject Area: Industrial Chemistry Module: Selection of Specific Technologies			
Course unit title and code	G716 - Industrial Chemistry			
Number of ECTS credits allocated	6	Term	Semester based (1)	
Web				
Language of instruction	English		Mode of delivery	Face-to-face

Department	DPTO. DE QUIMICA E INGENIERIA DE PROCESOS Y RECURSOS.
Name of lecturer	JAVIER RUFINO VIGURI FUENTE
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Other lecturers	TAMARA LLANO ASTUY CRISTINA RUEDA RUIZ

3.1 LEARNING OUTCOMES
- Apply and execute basic calculations to solve mass and heat transfer unit operations and ideal reactors.
- Create and interpret chemical process designs at preliminary level.
- Apply modern process simulation tools to industrial process subsystems synthesis and analysis.

4. OBJECTIVES

The objective for the students is to be able to interpret industrial processes based on chemical reaction, apply separation unit operations to raw material and product purification and to be able to create, analyze and evaluate preliminary chemical process designs to meet desired needs.

6. COURSE ORGANIZATION

CONTENTS	
1	PART I: 1.- INTRODUCTION 1.1.-Introduction to the Industrial Chemistry
2	PART II: 2.- MATERIALS and ENERGY FLOW ANALYSIS 2.1.-Mass and energy balances 2.2.-Mass transfer and separation unit operations 2.3.-Materials flow analysis. Valorization 2.4.- Case studies
3	PART III: 3.- CHEMICAL REACTION ENGINEERING and BIOTECHNOLOGY 3.1.- Chemical kinetics 3.2.- Chemical reactor design 3.3.- Unit operations involving chemical reaction 3.4.- Bioprocess Engineering 3.5.- Case studies
4	PART IV 4.- PROCESS SYSTEM ENGINEERING 4.1.- Preliminary process design 4.2.- Product design 4.3.- Modeling, simulation and optimization 4.4.- Practical Classes. Simulation of case studies with mass and energy balances, unit operations and chemical reactor.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Individual Exam 1	Written exam	No	Yes	30,00
Individual Exam 2	Written exam	No	Yes	30,00
Practical work	Laboratory evaluation	No	No	15,00
Case Studies	Work	No	Yes	25,00
TOTAL				100,00

Observations

Each partial exam with a minimum average grading of 5 (0-10 mark system) to access to the continuous assessment. Average of the partial exams will be done only when both partials reach the minimum grade of 5.0. Practical work in computer room: Exam in computer room (10% mark) + Delivery of problems in each sesion and active participation (5% mark) + minimum of 90 % attendance at practical class in computer room. Mínimum 90% attendance at practical class of working groups solving the case study. Case studies include the Project working group, oral presentation and report of poster sessions. Ordinary final exam will be related to the fail parts (grading lower than 5.0) during continuous assessment (partial exams 1 or/and 2). Extraordinary exam will be related to the entire course (partial exam 1 + partial exam 2) regardless of the marks obtained in the partial exams and /or in the ordinary exam.

Observations for part-time students

Part-time students may choose between the continuous assessment or assessment in Ordinary and extraordinary call of exam together the delivery of the Case Studies and Aspen works under the scheduling of the teachers .

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Felder R.M., Rousseau R.W., 2005. 3rd Ed. Elementary principles of chemical processes. John Wiley & Sons, Inc

Geankoplis C.J., 2007. Transport processes and separation process principles : (includes unit operations) 4th. ed. Prentice Hall Professional Technical Reference

Levenspiel O., 1999. Chemical reaction engineering. 3rd Ed. John Wiley & Sons

Fogler H.S., 2006, Elements of chemical reaction engineering. 4th Ed. Prentice Hall, PTR

Seider W., Seader J., Lewin D., Widagdo S., 2001. Product and process design principles. 3rd Ed. John Wiley & Sons.

Allen, DT, Shonnard, DR, 2002. Green Engineering "Environmentally conscious design of chemical processes" . PH-PTR

Shuler, M.L., Kargi, F. 2002, Bioprocess Engineering. Basic Concepts. Prentice Hall

Himmelblau D.M., Riggs, J.B., 2003. Basic Principles and calculations in chemical engineering:International Ed. Addison-Wesley

Simpson, R., Sastry, S., 2013, Chemical and Bioprocess Engineering. Springer.

Asokan, K., 2007. Chemical Process Calculations: Lecture Notes. Ed. Universities Press.

Roy, H., 2016, Reaction engineering Principles. CRC Press.