SUBJECT TEACHING GUIDE

G780 - Chemical Reactor Engineering

Degree in Chemical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Balances, Biotechnology, Separation, Chemical Reaction Engineering, Reactor Design, Assessment and Transformation of Resources Module: Compusory Training Industrial Chemistry				
Course unit title and code	G780 - Chemical Reactor Engineering				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR
Name of lecturer	EUGENIO BRINGAS ELIZALDE
E-mail	eugenio.bringas@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO EUGENIO BRINGAS ELIZALDE (S2013)
Other lecturers	INMACULADA ORTIZ URIBE ALFREDO ORTIZ SAINZ DE AJA LUCIA GOMEZ COMA GUILLERMO DIAZ SAINZ

3.1 LEARNING OUTCOMES

- Fundamentals of the performance, design and optimization of homogeneous reactors with ideal flow patterns
  Flow patterns in chemical reactors
  Introduction to the fundamentals of heterogeneous reactors

4. OBJECTIVES

Understanding the phenomena guiding the performance of chemical reactors
Development of property, mass , thermal energy and momentum, balances in homogeneous reactors,
Solution of the mass , thermal energy and momentum balances in homogeneous reactors,

6. COURSE ORGANIZATION

CONTENTS	
1	THEME 1. Analysis and design of ideal reactors for homogeneous reactions 1.1.Chemical Reaction Engineering Fundamentals. Classification of homogenoeus reactors with respect to flow pattern. 1.2. Solution of the mass balance. Comparison of the performance of homogenoeus reactors with ideal flow for simple and complex reactions 1.3. Solution of the heat balance
2	THEME 2. Analysis and solution of the themal energy balance 3.1. Adiabatic reactors 3.2. Non-adiabatic reactors
3	THEME 3. Flow pattern characterization in chemical reactors 3.1 Fluid flow and mixing in chemical reactors 3.2 Laminar Flow Tubular reactors for homogeneous reactions . Turbulent flow tubular reactors

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam including theoretical and practical issues	Written exam	No	Yes	30,00
Written exam including theoretical and practical issues	Written exam	No	Yes	30,00
The continuous evaluation procedure (CE) consists of two written tests (60%) with part of theory and problems and follow-up tests (40%) of theory and problems carried out during the classes throughout the term. To pass the course by means of EC it is nece	Others	No	Yes	40,00
TOTAL				100,00

Observations

The continuous assessment conssits of two wrtitten exams 1 and 2 .The sutdents who do not pass the subject following this procedure will have a final exam scheduled by the ETSIIyT (minimum grade 5.0).
In case of interruption of face-to-face learning by activation of health alert activation, the assesment procedure will not be modified and it will be performed using virtual tools.

Observations for part-time students

Article 24 in Reglamento de los Procesos de Evaluación en la Universidad de Cantabria will be applied

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- O.Levenspiel “Ingeniería de las Reacciones Química” Limusa Wiley (2004).
-H. Scott Fogler. “Elements of Chemical Reactor Engineering” Pearson Prentice Hall (2020)
- G.F.Froment, K.B.Brischoff “ Chemical Reactor Analysis and Design “ John Wiley (1990).
- E.B.Nauman “Chemical Reactor Design“ Krieger Pub. Co. (1992).
- L.K.Doraiswamy, M.M.Sharma, “Heterogeneus reactions. Analysis, examples and reactor design” John Wiley & Sons (1984).
- Y.T. Shah “Gas-Liquid-Solid reactor design” McGraw-Hill Inc. (1979).
- J.J.Carberry, A.Varma “Chemical reaction and Reactor Engineering” Marcel Dekker (1987).
- H.Rase “Chemical Reactor Design for Process Plants” Ann Arbor (1992).