

SUBJECT TEACHING GUIDE

G782 - Experimentation in Chemical Engineering

Degree in Chemical Engineering First Degree in Chemical Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering First Degree in Chemical Engineering			Type and Year	Compulsory. Year 2 Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Experimentation in Chemical Engineering Module: Compusory Training Industrial Chemistry				
Course unit title and code	G782 - Experimentation in Chemical Engineering				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR
Name of lecturer	MARIA FRESNEDO SAN ROMAN SAN EMETERIO
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO DE MARIA FRESNEDO SAN ROMAN SAN EMETERIO (S2012)
Other lecturers	RAQUEL IBAÑEZ MENDIZABAL PEDRO MANUEL GOMEZ RODRIGUEZ AXEL ARRUTI FERNANDEZ FERNANDO PARDO PARDO GLORIA GONZALEZ LAVIN

3.1 LEARNING OUTCOMES

- By the end of the semester the student should be able to:
- Use chemical engineering equipment and materials correctly.
- Find data in literature, handbooks and databases related to experimental needs.
- Carry out experiments related to the determination of thermodynamic properties, heat transport, chemical reactions, etc. and critically analyse the results obtained.
- To write technical reports related to the experimental activities carried out in the laboratory .
- To discuss in public the results of his/her experimental work.

4. OBJECTIVES

- The student should acquire knowledge and skills related to experimental work in a chemical engineering laboratory.
- The student should be able to relate the theoretical knowledge acquired in other subjects to the experimental activities carried out in this course.

6. SUBJECT PROGRAM

CONTENTS	
1	MODULE A. INTRODUCTION Topic 1. Introduction to the subject of experimentation in chemical engineering. Topic 2: Safety and hygiene in the chemical engineering laboratory.
2	MODULE B. DETERMINATION OF TRANSPORT PROPERTIES AND PARAMETERS Topic 3. Molecular diffusivity in liquids. Determination of the diffusivity coefficient of inorganic species in water . Topic 4. Molecular diffusivity in gases. Determination of the diffusion coefficient of a gas by evaporation from a liquid surface. Topic 5. Determine the viscosity of Newtonian and non-Newtonian fluids. Topic 6. Determine the solid-liquid transfer coefficient in a stirred tank .
3	MODULE C. BASIC OPERATIONS OF MOTION, HEAT AND MASS TRANSFER Topic 7. Motion of compressible and non-compressible fluids. Friction in straight pipes. Topic 8. Study of the characteristics of shell and tube and plate heat exchangers. Topic 9. Rectification of binary mixtures.
4	MODULE D. ADVANCED METHODS OF SEPARATION Topic 9. Ion exchange resin operations. Topic 10. Membrane processes: characterisation of ultrafiltration membranes.
5	MODULE E. CHEMICAL REACTORS AND KINETICS OF CHEMICAL REACTIONS Topic 12. Kinetic study of the chemical reaction of saponification of ethyl acetate.
6	MODULE F. OPERATIONS ON SOLIDS Topic 13. Characterising the size of irregular solids.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
The portfolio will consist of the presentation, analysis and justification of the results obtained during the practical sessions.	Others	No	Yes	40,00
Written exam covering topics 2-13 developed during the practical sessions of the course.	Written exam	No	Yes	60,00
TOTAL				100,00
Observations				
<p>PASSING the subject through CONTINUOUS EVALUATION means:</p> <ul style="list-style-type: none"> -Achieving a score of 5.0 in the Portfolio (PF). -Obtaining a mark of 5.0 in the objective test (PO). <p>The continuous assessment includes the student's performance in the laboratory as well as compliance with the rules of safety, cleanliness, punctuality, care of materials and order of documents. It will also take into account the student's progress in their ability to present the results of the practical sessions carried out throughout the course.</p> <p>In the case of NOT PASSING the course through the CONTINUOUS EVALUATION, the student must pass the evaluation through the EXTRADINARY EXAMINATION, which is 100% of the course and gives the FINAL GRADE.</p> <p>Attendance at practical sessions is compulsory.</p>				
Observations for part-time students				
Article 15 of Title VI. CONTINUOUS EVALUATION AND SINGLE EVALUATION FOR PART-TIME STUDENTS of the REGULATION ON EVALUATION PROCEDURES AT THE UNIVERSITY OF CANTABRIA shall apply.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
<ul style="list-style-type: none"> -Bird R.B., Stewart W.E., Lightfoot E.N. Fenómenos de transporte: Un estudio sistemático de los fundamentos del transporte de materia, energía y cantidad de movimiento. Ed. Reverté, Barcelona, 1964. -Calleja Pardo G., García Herruzo F., Iglesias Morán J., Lucas Morán A., Rodríguez Maroto J.M. Nueva introducción a la ingeniería química. Volúmenes I y II. Ed. Síntesis, Madrid, 2016. -Cussler E.L. Diffusion mass transfer in fluid system. Ed. Cambridge University Express, 3ª ed., Cambridge, 2007. -Dutta, B.K. Principles of mass transfer and separation processes. Ed. PHI Learning Private Limited, Delhi, India, 2017. -Gonzalez J.R. et al. Cinética Química Aplicada, 1ª edición, Ed. Síntesis, Madrid (España), 1999. -Levenspiel O. Flujo de fluidos e intercambio de calor. Ed. Reverté, Barcelona, 1993. -Levenspiel, O. Ingeniería de las Reacciones Químicas, 3ª edición, Ed. Limusa Wiley, México, 2004. -McCabe W.L., Smith J.C., Harriott P. Operaciones unitarias en ingeniería química. Ed. McGraw-Hill Interamericana, 7ª ed., México, 2007. -Merkus, H. G. Particle Size Measurements, Fundamentals, Practice, Quality. Ed. Springer, 1ª ed. (Inglés), Países Bajos, 2009. -Perry R.H., Green D.W., Maloney J.O. Manual del ingeniero químico. Ed. McGraw-Hill, 4ª ed. (Español), Madrid, 2001. -Viswanath D. S., Ghosh T. K., Prasad D. H. L., Dutt N. V. K., Viscosity of liquids. Theory, Estimation, Experiment, and data. Ed. Springer, 1ª ed., Suiza, 2007. -Wankat P.C. Ingeniería de procesos de separación. Ed. Pearson Educación, 2ª ed., México, 2008.

