

School of Industrial Engineering and Telecommunications

SUBJECT TEACHING GUIDE

G779 - Fundamentals of Biomolecular Engineering

Degree in Chemical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA									
Degree	Degree in Chemical Engineering				Type and Year	Compulsory. Year 2			
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	G779 - Fundamentals of Biomolecular Engineering								
Number of ECTS credits allocated	6	Term		Semeste	ster based (2)				
Web									
Language of instruction	Spanish	English Friendly	Yes	Mode of o	delivery	Face-to-face			

Department	DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR
Name of lecturer	IGNACIO FERNANDEZ OLMO
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Other lecturers	JONATHAN ALBO SANCHEZ JAVIER PINEDO ALONSO

3.1 LEARNING OUTCOMES

--To demonstrate the knowledge about the main types of biomolecules and living beings

-To understand the basic concepts about the organization and behaviour of living beings at molecular level

-To understand the energy sources and metabolite synthesis in cells

-To understand how the metabolic activity is regulated in the cell

-To demonstrate the knowledge about the engineering applications of cells and their molecules

-To demonstrate the knowledge about the social and ethic aspects related to the rapid growth of the biochemical and

biomolecular technology



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4. OBJECTIVES

-To show the main biomolecules in living beings

-To show how cells work at molecular level; this will lead to their engineering applications

-To introduce the main engineering applications of cells and their molecules

6. COURSE ORGANIZATION				
CONTENTS				
1	Fundamentals of molecular and cellular biology 1.1. Introduction 1.2. Biomolecules in living beings 1.3. Cells: types and growth requirements			
2	Enzymology 2.1. Enzymes: characteristics, their production and main applications 2.2. Homogeneous enzyme kinetics 2.3. Introduction to immobilized enzyme systems			
3	How cells work 3.1. Cellular metabolism 3.2. Gen expression and storing 3.3. Major metabolic pathways and their regulation			
4	Introduction to molecular genetics 4.1. Fundamentals of genetic engineering and its application 4.2. Molecular diagnosis 4.3. Social and ethic aspects in biotechnology			
5	Bioprocess engineering 5.1. Cellular growth and metabolite synthesis 5.2. Batch and continuous cultures 5.3. Applications in biotechnology: biomolecules production			



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7. ASSESSMENT METHODS AND CRITERIA								
Description	Туре	Final Eval.	Reassessn	%				
The contents of topics 1 and 2 will be evaluated at the 8th week. In case of an off-site scenario, the evaluation will be based on short time-limited questionnaires and tasks.The minimum rate must be 4/10. It accounts for 35 %	Written exam	Yes	Yes	35,00				
The contents of topics 3 and 5 will be evaluated at the 15th week. In case of an off-site scenario, the evaluation will be based on short time-limited questionnaires and tasks.The mínimum rate must be 4/10. It accounts for 30 %	Written exam	Yes	Yes	30,00				
An individual or team work will be developed. In case of an off-site scenario, team works would be replaced by individual works. It accounts for 25 %	Work	No	No	25,00				
Topic 4: Writing of a summary of the student's opinion on the subject of transgenic foods based on a face-to-face discussion. In case of an off-site scenario, the summary will be done after watching videos dealing with this topic. It accounts for 10 %.	Work	No	No	10,00				
TOTAL								
Observations								

The continuous evaluation requires to do exams 1 and 2, writting a summary on transgenic food, and the delivery of an individual or team work.

If the student chooses a team work, it will be presented to the audience

Observations for part-time students

In the event that there are no alternative options that allow the part-time student to participate regularly in face-to-face teaching activities, the student may be subject to a single assessment process, consisting of taking an exam in the ordinary call.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

"Bioprocess Engineering. Basic Concepts". Shuler, M.L., Kargi, F.Ed. Prentice Hall, 2002 "Biochemical engineering fundamentals". Bailey, J.Y., Ollis, D.V. Ed. McGraw-Hill, 1986