

## SUBJECT TEACHING GUIDE

G786 - Process Biotechnology

Degree in Chemical Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Option A: Fundamental Chemical Engineering Optional Module				
Course unit title and code	G786 - Process Biotechnology				
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	IGNACIO FERNANDEZ OLMO				
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 5. DESPACHO I. FERNANDEZ OLMO (S5004A)				
Other lecturers	MARCOS FALLANZA TORICES				

### 3.1 LEARNING OUTCOMES

- To demonstrate knowledge about the implications of a biotechnological process
- To deepen into the kinetic equations describing the enzymatic and cell growth reactions
- To be able to design bioreactors
- To know different biomolecules separation, concentration and purification options

#### 4. OBJECTIVES

- To deepen into the main steps of a bioprocess
- To deepen into the kinetic equations of enzymatic reactions (homogeneous and immobilized enzymes), cell growth and metabolites production kinetics
- To show different bioreactor design options
- To introduce the main biomolecules separation, concentration and purification techniques
- To deepen into bioprocesses through different case studies

#### 6. COURSE ORGANIZATION

CONTENTS	
1	Topic 1: Bioprocesses 1.1. Bioprocesses and bioproducts
2	Topic 2: Bioreactions 2.1. Enzymatic kinetics: homogeneous and immobilized enzymes 2.2. Cell growth, substrate consumption and product formation kinetic models
3	Topic 3: Bioreactors 3.1. Conventional bioreactors 3.2. Bioreactors for immobilized systems 3.3. Aeration 3.4. Sterilization and heat transfer in bioreactors
4	Topic 4. Downstream processes in biotechnology 4.1. Biomass/fermentation broth separation and cell disrupting 4.2. Biomolecules separation/concentration techniques 4.3. Biomolecules purification techniques
5	Topic 5: Case studies 5.1. Bioreactors for water treatment or Bioreactors for waste gas treatment

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	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. It accounts for 30 %	Written exam	Yes	Yes	30,00
The contents of topics 3 and 4 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. It accounts for 30 %	Written exam	Yes	Yes	30,00
A teamwork will be prepared and publicly presented on the basis of topic 5. In case of an off-site scenario, it will be presented by videoconference. It accounts for 40 %	Work	No	No	40,00
<b>TOTAL</b>				<b>100,00</b>
Observations				
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
"Biochemical Engineering". Kato S. and Yoshida F. Ed Wiley-VCH, 2011
"Ingeniería de Bioprocesos" Diaz, M. Ed. Paraninfo, 2012
"Bioprocess Engineering. Basic Concepts" Shuler M.L. and Kargi F. Ed. Prentice Hall, 2002