COURSE TEACHER GUIDE: 2016-17

BASIC DATA OF THE SUBJECT			
Subject:	Laboratory of BioProcess (UAL)		
Subject code:	70801206	Plan:	Master's degree in Chemical Engineering
Academic year:	2016-17	Training cycle:	Official Master's degree
Course of the degree:	1	Type:	Optional
Duration:	Second semester		

TIME DISTRIBUTION OF THE SUBJECT ACCORDING TO REGULATIONS			
Credits:	3	Student classroom hours:	22.5
		Hours not contact of the student:	52.5
Total hours:			75
USE OF THE VIRTUAL PLATFORM:			Support for teaching

TEACHER DATA			
Name	**Mazzuca Sobczuk, Tania**		
Department	Dept. of Engineering		
Building	Building Scientist Technician II - 1		
Office	310		
Phone	+ 34 950 015901	(Institutional) e-mail	tmazzuca@ual.es
Personal Web resources	Website of Mazzuca Sobczuk, Tania		
Name	**Brindley alias, Celeste Elena**		
Department	Dept. of engineering		
Building	Building Scientist Technician II - low		
Office	270		
Phone	+ 34 950 214110	(Institutional) e-mail	cbrindle@ual.es
Personal Web resources	Brindley Web alias, Celeste Elena		

ORGANIZATION OF ACTIVITIES		
Activities for learning and time distribution of the scholarly work by activity (estimate in hours)		
I. ACTIVITIES OF THE STUDENT (Presential / Online)	• Large group	0.0
	• Group teaching	22.5
	• Small group/working group	0.0
	Total hours Presenciales/On line...	22.5
II. NON-PRESENTIAL ACTIVITIES OF THE STUDENT (work self-employed)	• (Group work, individual work)	52.5
	Total non-Presential hours...	52.5
TOTAL HOURS OF STUDENT WORK	75.0	

ITEMS OF INTEREST FOR LEARNING THE COURSE
Justification of the content
Bioprocess Engineering is the modification or application of renewable raw materials to produce value-added products. This engineering has currently multiple applications in continuouosly developing areas such as as the pharmaceutical industry, the food and the bioremediation among others. It is necessary then that future professionals have mastered the knowledge, skills and techniques necessary to design, carry out and analyze and discuss experiments where to develop this type of bioprocesses.
Matter that relates to the Plan of studies
This subject is closely related to other subjects of the block of Engineering Processes and Products listed in the memory of the master.
Skills needed to deal with the subject

It is recommended to have a good management of basic laboratory techniques such as preparation of solutions, skills for report writing and management of computers. It is advisable to have acquired knowledge of the kinetics of the growth of microorganisms, basic operations in general and chemical reactors.

Prerequisites :

COMPETENCIES

General competences

University of Almería generic competencies

Other generic *competencies*

Developed specific competences

CG4 - carry out appropriate research, undertake design and direct the development of engineering solutions, in new or little-known environments linking creativity, originality, innovation and technology transfer. (General)

CB6 - own and understand knowledge that can provide a base or opportunity to be original in the development and/or application of ideas, often in a context of research. (General)

CT1 - teamwork by promoting the development of skills in human relations. (Cross)

CT4 - communicating scientific concepts and technicians using the most common audiovisual media, developing oral communication skills. (Cross)

CE1 - apply knowledge of mathematics, physics, chemistry, biology and other natural sciences, gained by study, experience, and practice, with critical reasoning to establish economically viable solutions to technical problems.

CE2 - designing products, processes, systems and services of the chemical industry, as well as the optimization of others already developed, on the technological basis the various areas of chemical engineering, comprehensive transport, operations of separation and reaction chemical, nuclear engineering, electrochemical and biochemical phenomena and processes.

LEARNING OBJECTIVES/OUTCOMES

Designing experiments to completelly perform a simple BioProcess, from raw materials to the product. Kinetic Modeling of growth of micro-organisms, production of bioproducts, etc... applying computer tools. Interpret and discuss the results of the experiments with existing literature and similar experiments. Summarize and present the results. Students will have everything you need in the laboratory in order to develop the full BioProcess from raw material to product and head towards the basic operation chosen at each time. You can model dynamic processes with the help of mathematical software (Matlab, Sigmaplot, Mathcad, Excel, etc.) provided by teachers using computers in a specific room for this purpose. They will perform and discuss the results with the comparison with other similar experiments using available literature. Using the presentation oral will learn to summarize all a discussion of results in little time.

THEMATIC AND ORGANIZATIONAL MODALITIES

Block	TRAINING PRACTICE IN INDUSTRIAL BIOTECHNOLOGY		
Content/topic			
	Disinfection and sterilization techniques.		
Organizational modalities and methodology of work			
Mode organizational	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Other	Work of laboratory	0.2

Description of the autonomous student work

Reading and study.

Content/topic			
	Preparation of media.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Other	Laboratory work	0.2
	Evaluation session		0.1

Description of the autonomous student work

To study. Calculations for the preparation of solutions.			
Content/topic			
	Preparation and set up of bioreactors.		
Modalities organisational and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.1
	Other	Laboratory work	0.4
Description of the autonomous student work			
To study. Autonomous work in the laboratory.			
Block	MANAGEMENT OF MICROORGANISMS		
Content/topic			
	Generalities.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5
Description of the autonomous student work			
To study.			
Content/topic			
	Preparation and maintenance of inoculum.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Other	Work of laboratory	0.5
Description of the autonomous student work			
Laboratory tasks. To study.			
Block	EVALUATION OF CRITICAL PARAMETERS IN BIOREACTORS.		
Content/topic			
	Introduction to critical parameters in bioreactors.		
Modalities organisational and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5
Description of the autonomous student work			
To study.			
Content/topic			
	Monitoring of critical parameters in the laboratory.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.2
	Other	Laboratory work	0.3
Description of the autonomous student work			
To study. Laboratory work.			
Content/topic			
	Comparison of bioprocesses with different values of their critical parameters.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Exhibition of working groups		0.2
	Others		2.0

		Laboratory work. Problem solving and case studies in group study.	
	Evaluation session		0.1

Description of the work independent of the student
To study. Data collection in the laboratory.

Content/topic	
	Data treatment of critical parameters.

Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.0
	Others	Data treatment using software.	1.0
	Evaluation session		0.2

Description of the autonomous student work
To study. Complete the tasks started in class.

Block	APPLICATION OF DIFFERENT CULTURING SYSTEMS FOR THE PRODUCTION OF METABOLITES.

Content/topic	
	Systems for the production of metabolites.

Organizational modalities and methodology of work			
Mode organizational	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5

Description of the autonomous student work
To study.

Content/topic	
	Experiment with different culture systems for the production of metabolites.

Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Exhibition of working groups		0.2
	Others	Laboratory work	1.7
	Evaluation session		0.3

Description of the autonomous student work
Data collection in the laboratory.

Block	APPLICATION OF BIOCATALYSTS

Content/topic	
	Biocatalysts. Generalities.

Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5

Description of the work independent of the student
To study.

Content/topic	
	Processes using biocatalysts.

Organizational modalities and methodology of work			
Organizational mode	*Procedures and activities training*	*Observations*	*Hours Pres. / On line*
Group teaching	Other	Work of laboratory. Completion of works	1.5

Description of the autonomous student work
Data treatment. Studying.

Block	DETERMINATION OF KINETIC PARAMETERS.

Content/topic			
	Kinetic parameters and models.		
Modalities organisational and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5
Description of the autonomous student work			
To study.			
Content/topic			
	Determination of kinetic parameters from experimental data.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Other	Laboratory and computer laboratory work.	2.0
Description of the autonomous student work			
To study.Taking experimental data in the laboratory. Analysis of data.			
Block	DOWNSTREAM PRODUCTS OF INTEREST.		
Content/topic			
	Industrial processes for obtaining of bioproducts.		
Organizational modalities and methodology of work			
Mode organizational	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5
Description of the autonomous student work			
To study.			
Content/topic			
	Design and implementation of bioprocesses to laboratory-scale.		
Organizational modalities and methodology of work			
Mode organizational	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Exhibition of working groups		0.2
	Other	Lab work sessions	2.6
	Evaluation session		0.5
Description of the autonomous student work			
Data collection. Monitoring of the process. To study.			
Block	IMPLEMENTATION OF ANALYTICAL TECHNIQUES FOR MONITORING AND OPTIMIZATION OF BIOPROCESS AND ANALYSIS OF CRITICAL DATA.		
Content/topic			
	Analytical techniques.		
Organizational modalities and methodology of work			
Mode organizational	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Other	Completion of works	1.5
	Evaluation session		0.3
Description of the autonomous student work			
Search and analysis of information. To study.			
Content/topic			
	Implementation of analytical methods for monitoring the BioProcess.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Others	Laboratory work	1.8
	Evaluation session		0.2

Description of the work independent of the student			
Data collection in the laboratory. To study.			
Content/topic			
	Critical analysis of data and the BioProcess optimization.		
Organizational modalities and methodology of work			
Organizational mode	*Procedures and training activities*	*Observations*	*Hours Pres. / On line*
Group teaching	Master/participatory classes		0.5
	Discussion and sharing		0.4
	Exhibition of working groups		0.1
	Evaluation session		0.2
Description of the work independent of the student			
To study. Preparation of reports. Analysis of data.			

PROCEDURE OF EVALUATION OF THE COMPETENCIES

Evaluation criteria

System (E1): Presentation of works and activities. It will contribute 70% of the final grade according to the following criteria:

- Students must demonstrate that has been capable of plan and carry out t a BioProcess from the raw materials until the product, modelling the required processes, provable through the work face-to-face, through assistance and participation. The maximum score in this sense will be obtained if students attend working sessions, actively participates and has a dynamic attitude to laboratory work and the processing of data, which will be correct and tight, up to a maximum of 4 points. (NG4, CT1, CB6, CE1, CE2)

- To demonstrate the competition of the students for the synthesis and exhibition of the results obtained there will be held an exhibition using media audiovisual, obtaining a maximum score of up to 3 points. (CT4, CB6, CE1)

System (E2): Tests written. It will provide a 30% of the final grade according to the following criteria:

Written tests will be preferably used may be distributed along the course in the form of small content tests. It will be awarded up to a maximum of 3 points. (CE1, CE2, CT4)

Percentages of evaluation of activities to be performed by students

	Activity	*(Nº hours)*	*Percentage*
I. ACTIVITIES OF THE STUDENT (Presential / Online)	• Large group	(0)	0%
	• Group teaching	(22.5)	55%
	• Small group/working group	(0)	0%
II. NON-PRESENTIAL ACTIVITIES OF THE STUDENT (Independent study)	• (Group work, individual work)	(52.5)	45%

Assessment instruments

- Test / interview diagnostic initial.
- Self-assessment (individual and group) of the process.
- Observations of the process.
- Final evaluation of reports, papers, projects, etc.
- Final tests (written or oral).
- Student portfolio.
- Self-assessment end of the student.

Follow-up mechanisms

- Attendance at tutorials
- Assistance and participation in seminars
- High and access to the virtual classroom
- Delivery of activities in class
- Delivery of activities in tutorials
- Delivery of activities in virtual classroom

BIBLIOGRAPHY

Recommended bibliography

- Biochemical engineering and biotechnology handbook *(Atkinson, B.)* - basic bibliography
- Bioprocess Engineering Principles *(Doran, Pauline M.)* - basic bibliography
- Manual of Industrial Microbiology and Biotechnology *(DEMAIN, a.)* - basic bibliography
- The chemical reactor omnibook *(Levenspiel, Octave)* - basic bibliography

Existing literature in the information system of the library of the UAL

You can view the existing literature today in the library management system consultation at the following address:

http://almirez.ual.es/search/x?SEARCH=70801206

WEB ADDRESSES

- http://eva.ual.es
  Access to the virtual platform
- http://almirez.ual.es/screens/mainmenu2_spi.html
  Access to the library catalogue