

**1. General information****Course:** BIOPROCESS ENGINEERING I**Type:** CORE COURSE**Degree:** 402 - UNDERGRADUATE DEGREE PROGRAMME IN BIOTECHNOLOGY**Center:** 601 - E.T.S. AGRICULTURAL ENGINEERS AND MOUNTS AB**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 60614**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 10**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** ANDRES ALVARRUIZ BERMEJO - Group(s): 10

Building/Office	Department	Phone number	Email	Office hours
Edificio Manuel Alonso Peña.	PROD. VEGETAL Y TGIA. AGRARIA	2849	andres.alvarruiz@uclm.es	

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

Not established

4. Degree competences achieved in this course**Course competences**

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CE10	Apply mass and energy balances to calculate systems, and obtain results from heat and mass transfer processes and separation processes.
CG01	Organizational and planning skills.
CG02	Capacity for analysis and synthesis.
CG03	Ability to work in multidisciplinary teams collaboratively and with shared responsibility.
CG04	Sensitivity towards environmental issues.
CT01	Know a second foreign language.
CT02	Know and apply the Information and Communication Technologies.
CT03	Use correct oral and written communication.
CT04	Know the ethical commitment and professional deontology.

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

To Recognize the devices used for the application of the main biotechnological processes.

To Know the calculation methods and the design systems needed for the application of the main processes in the agri-food industry.

To know the physico-chemical rules that govern the process engineering

To know the different operations to process agri-food products

To know about the fundamentals of biotechnological processes at laboratory scale to understand their design at industrial scale.

To Acquire a critical attitude and aptitude towards the technologies applicable to the processes carried out in the agri-food industries

Additional outcomes**6. Units / Contents****Unit 1:****Unit 2:****Unit 3:****Unit 4:****Unit 5:****Unit 6:****Unit 7:**

Unit 8:
7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG04 CT01 CT03 CT04	1	25	Y	N	
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG03 CG04 CT01 CT02 CT03 CT04	0.24	6	Y	Y	
Class Attendance (practical) [ON-SITE]	Work with simulators	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG03 CG04 CT01 CT02 CT03 CT04	0.46	11.5	Y	Y	
Mid-term test [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG04 CT01 CT02 CT03 CT04	0.14	3.5	Y	Y	
Problem solving and/or case studies [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG03 CG04 CT01 CT02 CT03 CT04	0.36	9	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG04 CT01 CT02 CT03 CT04	2.8	70	Y	N	
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG03 CG04 CT01 CT02 CT03 CT04	0.8	20	Y	N	
Group tutoring sessions [ON-SITE]	Group tutoring sessions	CB01 CB02 CB03 CB04 CB05 CE10 CG01 CG02 CG03 CG04 CT01 CT02 CT03 CT04	0.2	5	Y	N	
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Practicum and practical activities reports assessment	30.00%	0.00%	
Assessment of active participation	10.00%	0.00%	
Mid-term tests	40.00%	60.00%	
Assessment of problem solving and/or case studies	20.00%	40.00%	
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	6
Class Attendance (practical) [PRESENCIAL][Work with simulators]	11.5
Mid-term test [PRESENCIAL][Assessment tests]	3.5
Problem solving and/or case studies [PRESENCIAL][Assessment tests]	9
Study and Exam Preparation [AUTÓNOMA][Self-study]	70
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	20
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	5
Global activity	
Activities	hours
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	70

Class Attendance (theory) [PRESENCIAL][Lectures]	25
Class Attendance (practical) [PRESENCIAL][Work with simulators]	11.5
Problem solving and/or case studies [PRESENCIAL][Assessment tests]	9
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	6
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	20
Mid-term test [PRESENCIAL][Assessment tests]	3.5
Total horas:	150

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Díaz Fernandez, J.M.	Ingeniería de los bioprocesos	Paraninfo		978-84-1366-023-3	2012	Bibliografía complementaria
Bird, Steward, Lightfoot	Fenómenos de transporte https://elibro.net/es/ereader/bibliotecaclm/117750	Reverte		9788429170504	1992	Bibliografía complementaria avanzada
Doran, P.M.	Bioprocess engineering principles	Elsevier		978-0-12-220851-5	2013	Versión actualizada y ampliada (en Inglés) del libro del mismo autor en castellano
Recasens, F.	Procesos de separación en biotecnología industrial https://elibro.net/es/ereader/bibliotecaclm/106566	Universitat Politècnica de Catalunya		978-84-9880-696-0	2018	Bibliografía básica
Fito, Castelló, Tarrazó, Castro	Balances de materia y energía en ingeniería de bioprocesos https://elibro.net/es/ereader/bibliotecaclm/160379	Universidad Politécnica de Valencia		978-84-9048-938-3	2020	Bibliografía básica
Ibarz, Albert	Operaciones unitarias en la ingeniería de alimentos https://elibro.net/es/ereader/bibliotecaclm/35857	Mundi-Prensa		84-8476-163-0	2005	Bibliografía básica aplicada a productos agroalimentarios
Perry, R. H.	Manual del ingeniero químico	McGraw-Hill		84-481-3008-1	2001	Manual de consulta ocasional
Doran, Pauline M.	Principios de Ingeniería de los Bioprocesos https://ebookcentral.proquest.com/lib/bibliotecaclm-ebooks/reader.action?docID=316993	Acribia		84-200-0853-2	1995	Bibliografía básica (Cap. 1-10)
Ostadfar, A.	Biofluids mechanics. Principles and applications. https://ebookcentral.proquest.com/lib/bibliotecaclm-ebooks/reader.action?docID=4544725	Elsevier		978-0-12-802408-9	2016	Bibliografía complementaria
Casablanças, F. y otros	Ingeniería bioquímica	Síntesis		84-7738-611-0	1998	Únicamente el capítulo 13 (Procesos de separación)