Universida_{de}Vigo

Subject Guide 2022 / 2023

IDENTIFYIN	G DATA			
Biotechnolo	Distant processes and products			
Subject	Biotechnological			
	products			
Code	V12G350V01922			
Study	Grado en			
programme	Ingeniería en			
p. e g. ae	Química Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
•	6	Optiona	l 4th	1st
Teaching	#EnglishFriendly	•		
language	Spanish			
Department		·		
Coordinator	Longo González, María Asunción			
Lecturers	Longo González, María Asunción			
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	enzymes or other biological systems) in emerging sector of high economic profita technological knowledge that allow dever application. The subject aims to provide students with biomolecules) for the development of bio processes. The main unit operations invo aspects that differentiate them from con continuous expansion, reference will be English Friendly subject: International stu- references in English, b) tutoring session	industrial processes. In ability, which makes it n loping and adapting bio h a global view on the u otechnological industrial olved in this type of proc ventional industrial cher made to the most recen udents may request fror is in English, c) exams a	e blotechnology ind ecessary to have th processes in the dif processes as an alt ess will be studied, mical processes. Giv t advances and trer n the teachers: a) n nd assessments in l	ustry can be considered an ne scientific and ferent sectors of microorganisms, cells or ternative to traditional as well as the specific ven that it is a field in nds. naterials and bibliographic English.
Skills				
Code	ended as to be also and to should also be the			
B3 CG3 Kn provide	owledge in basic and technological subject them the versatility to adapt to new situation of the second structure of the second se	ations.	ents to learn new m	ethods and theories, and
and trai	nsmit knowledge and skills in the field of i	sion making, creativity, industrial engineering sp	critical thinking and pecializing in Indust	rial Chemistry.
	asic knowledge and application of environ		for constainability.	rations, chamical reaction
enginee	ering, reactor design, and recovery and pr	ocessing of raw materia	ils and energy resou	urces.
	alysis and synthesis.			
	CT2 Oral and written proficiency.			
	al and whitten proficiency.			
	ply Niowieuge.			
	ritical thinking			
D17 CT17 W	lorking as a team			
<u></u>				

Learning outcomes Expected results from this subject

Training and Learning Results

Identification of the basic concepts of biotechnological processes, their products and their sources.	B3 B4	C19	D1 D2 D3 D9 D10
Knowledge and understanding of the biotechnological processes carried out by microorganisms of industrial interest, the stages of transformation and separation of products and the most common equipment used.	B3 B4	C16 C19	D1 D2 D3 D9 D10 D16 D17
Being able to propose biotechnological processes in different areas, through knowledge of methodology, requirements and regulations, considering aspects related to the environment, energy and resources.	B3 B4	C16 C19	D1 D2 D3 D9 D10 D16 D17

Contents	
Торіс	
Fundamentals of biotechnological processes: microorganisms, enzymes and other metabolites of industrial interest.	 Introduction to biotechnological processes. Microbiological and biochemical fundamentals, and raw materials used.
Technology of biotechnological processes and products. Design of a biotechnological process.	- Preparation of raw materials.
Practical cases.	- Reaction stage. Kinetics and operation of bioreactors.
	- Recovery and purification operations.
	- Study of commercial biotechnological processes and new trends.
Process intensification, energy integration, environmental and biosafety considerations.	- Energy integration methodologies
	- Introduction to the assessment of environmental impact of processes.
	- Biosafety. Best available techniques in the biotechnology industry.

Planning					
	Class hours	Hours outside the classroom	Total hours		
Case studies	9.5	24.5	34		
Laboratory practical	18	18	36		
Presentation	2	12	14		
Lecturing	15	15	30		
Mentored work	3	17	20		
Seminars	3	11	14		
Essay questions exam	2	0	2		
*The information in the planning table i	s for guidance only and does no	t take into account the het	erogeneity of the students.		

Methodologies	
	Description
Case studies	Processes of interest will be selected, which are representative of the current trends in the biotechnology sector, and a critical analysis will be carried out, in groups or individually. Short presentations will be made in the classroom, encouraging debate, as much as possible.
Laboratory practical	Laboratory experiments and field practices in companies related to the processes treated throughout the course will be carried out. The students will have the support material necessary for a proper understanding of the experiments to be carried out. A brief final report will be prepared in which the main results and conclusions should be collected.
Presentation	The students will make brief presentations of the cases studied in the classroom, as well as the supervised work. A question time will be included, in which the questions posed must be answered.
Lecturing	The lecturer will present the general aspects of the program in a structured way, with special emphasis on the fundamentals and most important or difficult to understand aspects. The lecturer will provide, through the Tem@ platform, the necessary material for a correct follow-up of the subject. The student will be able to work previously the material handed out by the lecturer and consult the recommended bibliography to complete the information.

Mentored work	The students will develop a smal project on a subject assigned by the lecturer. The work will be carried out in groups, that will deliver a written essay and make a presentation.		
Seminars	Proposal and resolution of practical cases related to the subject matter. Complementary activity to the case study.		

Personalized assistance			
Methodologies	Description		
Lecturing	Academic activity carried out by the lecturer during tutoring hours where students, individually or in small groups, can ask questions about the subject, and receive guidance and additional support. This activity can also be carried out in a remote way (through email or virtual campus).		
Laboratory practical	Academic activity carried out by the lecturer during tutoring hours where students, individually or in small groups, can ask questions about the subject, and receive guidance and additional support. This activity can also be carried out in a remote way (through email or virtual campus).		
Seminars	Academic activity carried out by the lecturer during tutoring hours where students, individually or in small groups, can ask questions about the subject, and receive guidance and additional support. This activity can also be carried out in a remote way (through email or virtual campus).		
Mentored work	Academic activity carried out by the lecturer during tutoring hours where students, individually or in small groups, can ask questions about the subject, and receive guidance and additional support. This activity can also be carried out in a remote way (through email or virtual campus).		
Case studies	Academic activity carried out by the lecturer during tutoring hours where students, individually or in small groups, can ask questions about the subject, and receive guidance and additional support. This activity can also be carried out in a remote way (through email or virtual campus).		
Presentation	Academic activity carried out by the lecturer during tutoring hours where students, individually or in small groups, can ask questions about the subject, and receive guidance and additional support. This activity can also be carried out in a remote way (through email or virtual campus).		

Assessment					
	Description	Qualification	Т	raining	g and
			Lea	rning	Results
Case studies	The work done during the seminars, case studies and practical classes will be evaluated based on:	25	В3 В4	C16 C19	D1 D2
	- assistance				D3
	- attitude and participation of the students during the sessions				D9
	- quality of submitted reports				D10
					D10 D17
Presentation	The students will make a presentation of the supervised work, which will be	e 10			D1
	assessed based on its clarity, rigor and demonstration of the knowledge				D3
	acquired on the subject.				D16
Montorod work	The report precepted on the accigned work subject will be evaluated. This	15	00	C16	
Mentored work	report must include some minimum aspects based on a quide that will be	15	вз В4	C10	D1 D2
	provided to the students.		5.	010	D3
					D9
					D10
					D16
Eccov questions	Final even composed of questions related to all the material made	E0	60	C16	
exam	available to the students during the face-to-face sessions	50	БЭ R4	C10	D1 D2
cxum			54	015	D3
					D9

Other comments on the Evaluation Details about evaluation and qualifications

The participation of the student in any of the acts of evaluation of the subject will imply the condition of presented and, therefore, the assignment of a qualification.

To pass the subject, it is necessary that the student obtain a minimum of 5 points out of 10 in the final exam and a minimum of 5 points out of 10 in the continuous assessment. The score of the continuous assessment will be calculated from the supervised work qualifications (30%), presentation (20%), and follow-up of practical cases seminars and practical sessions (50%).

If the minimum of 5 points out of 10 in the final exam and in the continuous assessment is achieved, the final mark will be

calculated as the sum of 50% of the continuous assessment mark and 50 % of the final exam grade. The same will apply if the student does not reach the established minimum in any of the two sections.

In the case of students who do not pass the minimum of 5 points out of 10 in one of the two parts of the evaluation (final exam or continuous assessment), the score of Fail will be assigned, with a numerical value equal to the mark obtained in the evaluation part in which the minimum level has not been achieved.

The qualification of the continuous evaluation section, if higher than 5 points out of 10, will be kept for the second evaluation opportunity (July), and therefore only the final exam will be necessary.

Students who renounce continuous assessment must take a final exam in which questions from all the activities of the course can be included (also those corresponding to practical classes), and their grade will be the mark obtained in this exam.

Ethical considerations

The student is expected to exhibit an adequate ethical behavior. In case of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others), it will be considered that the student does not meet the necessary requirements to pass the subject. In this case, the overall grade in the current academic year will be Fail (0.0).

The use of any electronic device during the evaluation tests will not be allowed unless expressly authorized. The introduction of a non-authorized electronic device in the exam room will be considered a reason for not passing the subject in this academic year and the overall rating will be Fail (0.0)

Sources of information

Basic Bibliography

Henry C. Vogel; Celeste L. Todaro, Fermentation and biochemical engineering handbook: principles, process design and equipment, 3ª, Elsevier, 2014

Michael R. Ladisch, **Bioseparations engineering : principles, practice, and economics**, 1^a, Wiley, 2001 Wim Soetaert, Erick J. Vandamme, **Industrial biotechnology : sustainable growth and economic success**, 1^a, Wiley-VCH, 2010

Robin Smith, **Chemical process design and integration**, 2ª, John Wiley & Sons, 2016

José A. Teixeira; Antonio A. Vicente, Engineering aspects of food biotechnology, 1ª, CRC Press, 2014

José López Carrascosa y Aurelia Modrego, La biotecnología y su aplicación industrial en España, 1ª, Universidad Carlos III, 1994

OECD, The application of Biotechnology to industrial Sustainability, 1ª, OECD Publishing, 2001 Complementary Bibliography

Recommendations

Subjects that continue the syllabus Modelling of biotechnological processes/V12G350V01924

Subjects that are recommended to be taken simultaneously

Product optimisation/V12G350V01701

Subjects that it is recommended to have taken before

Chemical engineering 1/V12G350V01405 Chemical engineering 2/V12G350V01503 Reactors and biotechnology/V12G350V01601