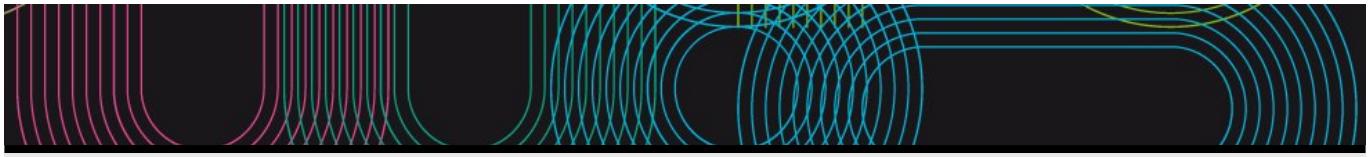

IDENTIFYING DATA				
Industrial biotechnology				
Subject	Industrial biotechnology			
Code	V02M074V11112			
Study programme	Máster Universitario en Biotecnología Avanzada			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Pazos Currás, Marta María			
Lecturers	Longo González, María Asunción Moldes Moreira, Diego Pazos Currás, Marta María Rodríguez Arguelles, María Carmen Rosales Villanueva, Emilio Sanroman Braga, María Ángeles Sieiro Vázquez, Carmen			
E-mail	mcurras@uvigo.es			
Web	http://http://masterbiotecnologiaavanzada.com/index.php/plan-docente/materias			
General description	Provide a vision of synthesis of some processes of the Industry *Biotecnológica, putting of self-evident the importance of the change of scale and the existent problems regarding the environment, the energy and the natural resources English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
A2	Aplication of the knowledges acquired and problem solving in new surroundings or little known in wider contexts (or multidisciplinary) related with the area of study
A4	Communicate findings and the ultimate knowledge and rationale underpinning them to specialist and non-specialist audiences in a clear and unambiguous way
B1	Analyses and sinthesis (found the right problems and identify causes and its typology)
B2	Organise and schedule all the resources (human, material, information and infrastructures)
B3	Capacity of information management (with support of TICs)
B4	Planificar y elaborar estudios técnicos en biotecnología microbiana, vegetal y animal
B5	Identify problems, make decisions and apply them in a biotech professional and research contexts.
B6	Oral and writting efective communication of the plans and maked decisions
B7	Formulate judgments on the current and future ethical and social problems posed by Biotechnology
B9	Multi-departamental team-work within the company
B10	Work in contexts of sustainability, characterized by: sensitivity to the environment and to different organizations that make it up as well as awareness for sustainable development
B11	Critical reasoning and deep respect for ethics and intellectual integrity
B12	Adapt to new legal situations, or technological innovations as well as exceptionalities associated with situations of emergency
B13	Autonomous Learning
B14	Leadership and coordination capacity
B15	Awareness towards quality, respect for the environment and the responsible consumption of resources and the recovery of waste

C8	Know the basics of the design and operation of a bioreactor
C9	Design and carried out a complete purification protocol for a molecule, organelle or cell fraction
C10	Design, plan, evaluate and optimize biotechnological production systems
C11	Design and manage biotechnology-based projects
D2	Oral and writing communication in the Galician language
D3	Sustainability and environmental commitment. Commit to sustainability and the environment. Fair use, responsible and resource efficient

Expected results from this subject

Expected results from this subject	Training and Learning Results
New	A2 B1 B13 C8 D3
Design and execute a complete protocol of purification of products of interest *biotecnológico	A2 B2 B4 B5 B6 B7 B9 B10 B11 B12 B14 B15 C9 D2 D3
Design, schedule, optimise and evaluate systems of production *biotecnológicos.	A2 B1 B2 B3 B4 B5 B6 B7 B9 B10 B11 B12 B13 B14 B15 C10 D2 D3
Analyse and design processes *biotecnológicos and operations associated	A2 A4 B1 B2 B3 B4 B5 B6 B7 B9 B10 B11 B12 B13 B14 B15 C11 D2 D3

Contents	
Topic	
MICROBIOLOGY	Introduction to the microbiology Bacteria Yeasts Funguses *Extremófilos
BIOTRANSFORMATIONS	Microbial technology Biotransformation to industrial level Practical Case
BIOCATALYSIS	Enzymatic technology Biocatalysis in means no conventional Advanced Catalyst
BIOREACTORS	Ideal Bioreactors Real Bioreactors of industrial application Real Bioreactors of environmental application
STERILISATION	Sterilisation by heat Sterilisation by leak Sterilisation by radiation
SEPARATION And PURIFICATION PRODUCT	Teams. Cellular disruption, Separation of cellular rests: Leak, Flocculation, Sedimentation and Centrifugation. Primary separation the concentration: Extraction and Adsorption Operations of purification of the product: Precipitation, Chromatography, Operations of membrane, Crystallisation and Desiccation
PRACTICAL CASE	Design of a bioprocess to industrial level

Planning	Class hours	Hours outside the classroom	Total hours
Lecturing	27	33	60
Studies excursion	4	4.5	8.5
Laboratory practical	4	0	4
Case studies	10	20	30
Objective questions exam	2	13.5	15.5
Report of practices, practicum and external practices	0	12	12
Essay	0	20	20
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	Description
Lecturing	Exhibition by part of the professor of the contents on the matter object of study, theoretical bases and/or guidelines of a work, exercise or project to develop by the student
Studies excursion	Realisation of visits of training in companies, institutions of the sector. To presence of the/the educational is necessary during the execution of the activity
Laboratory practical	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and procedures related with the matter object of study. They develop in special spaces with equipation skilled (scientific laboratories-technical, of languages, etc).
Case studies	Analysis of a fact, problem or real event with the purpose to know it, interpret it, resolve it, generate hypothesis, contrast data, thinking, complete knowledges, diagnose it and train in alternative procedures of solution.

Personalized assistance	
Methodologies	**Description**
Case studies	During the hours of *tutoría the students, individually or in group, can consult with theprofessors any doubt posed on the PRACTICAL CASE. The *profesorado will inform onthe available schedule in the presentation of the matter

Assessment			
	Description	Qualification	Training and Learning Results

Laboratory practical	It will evaluate the assistance to practices and seen to companies and the exploitation by means of reports/memory of practices	20	A2 A4	B2 B5 B6 B9 B13 B14 B15		D3
Case studies	It will make a memory and the defence of the work. Both issues will be evaluated	40	A2 A4	B1 B2 B3 B4 B5 B6 B7 B9 B10 B11 B13 B14 B15	C9 C10 C11	D2 D3
Objective questions exam	Proof of short answer in which it will evaluate the knowledges purchased in the master class	40	A2		C8	

Other comments on the Evaluation

To the equal that the rest of the matters of the Master, the evaluation will make of continuous way during the weeks assigned to the face-to-face teaching.

Sources of information

Basic Bibliography

Dilip K. Arora et al, **Handbook of fungal biotechnology**, Marcel Dekker, 2004

Graeme M. Walker, **Yeast physiology and biotechnology**, John Wiley Sons, 1998

W. Aehle, **Enzymes in industry: production and applications**, Wiley VCH, 2004

B. Atkinson et al, **Biochemical Engineering and Biotechnology Handbook**, The McMillan Press, 1991

F. Gòdia et al, **Ingeniería Bioquímica**, Síntesis, 1998

J. E. Bu'Lock et al, **Biotecnología Básica**, Acribia, 1991

A. Illanes, **Enzyme Biocatalysis. Principles and Applications**, Springer, 2008

Koki Horikoshi, **Extremophiles Handbook.**, Springer, 2011

Complementary Bibliography

G. Antranikian, **Extremophiles**,

H.J. Rehm et al, **Biotechnology a multi-volume comprehensive treatise**, VCH, 1991

A. Wiseman, **Handbook of enzyme biotechnology**, Halsted Press, 1995

H.W Blanch et al, **Biochemical Engineering**, Marcel Dekker, 1997

Recommendations

Other comments

It is advisable that the students have knowledge of English to level of compression of texts, since it splits of the sources of information that will consult are published in this tongue.