UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Plant Biotechnology		Code	610441020s
Study programme	Máster Universitario en Bioloxía Molecular, Celular e Xenética (semipresencial)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	Spanish			
Teaching method	Hybrid			
Prerequisites				
Department	Bioloxía			
Coordinador	Bernal Pita da Veiga, María de los Ángeles	E-mail	angeles.bernal@udc.es	
Lecturers	Bernal Pita da Veiga, María de los Ángeles Pomar Barbeito, Federico	E-mail	angeles.bernal@udc.es federico.pomar@udc.es	
Web				
General description	Biotechnologies useful in vegetal biology and uses			

Study programme competences	
Code	Study programme competences
A4	Skills to apply molecular techniques to the study of the plant cell physiology, its response to external triggers and their biotechnological applications.
A5	Skills of understanding the microorganisms' role as pathogenic agents and as biotechnological tools.
A8	Skills of having an integrated view of the previously acquired knowledge about Molecular and Cellular Biology and Genetics, with an interdisciplinary approach and experimental work.
A10	Skills of modifying genes, proteins and chromosomes with biotechnological applications
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
B3	Skills of management of the information: that are able to gather and to understand relevant information and results, obtaining conclusions and to prepare reasoned reports on scientific and biotechnological questions
B8	Critical reasoning skills and ethical commitment with the society: sensitivity in front of bioethical problems and to the ones related to the natural resource conservation
B9	Skills of preparation, show and defense of a work.
C1	Ability to express oneself correctly, both orally and in writing, in the official languages of the autonomous community
C2	Ability to know and use appropriately the technical terminology of the field of knowledge of the master, in the native language and in English, as a language of international diffusion in this field
C8	Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.

Learning outcomes			
Learning outcomes	Study programme competences		
Ability to manage information: gather and interpret data, information and relevant results, draw conclusions and issue reasoned reports on scientific and biotechnological issues		BR1 BR3 BR8 BR9	
Knowing the importance of research, innovation and technological development in the economic and cultural advancement of society.	AR5 AR10	BR8	CC1 CC2 CC8
Ability to understand the current state of the Plant Biotechnology and use Basic terminology used in the field	AR4 AR8	BR1	CC8
Adequate oral and written expression in the official languages			CC2 CC8

Contents	
Topic	Sub-topic
Module 1. Historical development of the Plant Biotechnology	1. The 1ª and 2ª Green Revolution 2. What is thePlant Biotechnology?
Module 2. Technical approach of the Plant Biotechnology	1. Genetic engineering in plants: general concepts 2. Methods of obtaining of transgenic plants
Module 3. Main applications of the Plant Biotechnology	1. Transgenic Plants applications

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	C1 C8	2	0	2
Online forum	B1 C2 C6	0	1	1
Document analysis	A4 A5 A8 A10 B1 B3 B8 B9 C2	0	35	35
Collaborative learning	A4 A5 A8 A10 B1 B3 B8 B9 C1 C8	10	20	30
Binary questions	A4 A5 A8 A10 B1 B3	2	0	2
Personalized attention		5	0	5
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Introductory activities	Activities used at beginning of any teaching-learning process to obtain information regarding student competences, interests and/or motivations in relation to specific learning outcomes, which educators may then incorporate in their planning to create more meaningful, effective learning experiences based on students? existing knowledge.
Online forum	Informal discussion space for students to exchange ideas concerning specific problem or topic. Interaction takes place in online learning environment using asynchronous communication tools (?forum?).
Document analysis	Research skills development involving use of audiovisual and/or bibliographical documents (documentary or film extracts, news items, advertising images, photographs, articles, legal texts, etc.) relating to specific topic of study, with targeted analysis activities. Used as introduction to topic, as focus for case study, to explain abstract processes and present complex situations, or as strategy for synthesising content (theoretical and practical).
Collaborative learning	Guided teaching-learning procedures (overseen in person and/or using ICT methods) based on organisation of class in which students work together to solve tasks assigned by teacher, with aim of optimising their learning experience and that of other members of group.
Binary questions	Objective test in which students are required to respond to a specific question using one of two closed answer options. (Answer options for binary questions are ?yes/no? or ?true/false?.)

Personalized attention	
Methodologies	Description
Introductory activities	In tutorial sessions, each student will discuss with the teacher the progress of the course, and all questions that are submitted to the content thereof. This tutorial sesions will be by Teams preferently, with previously date by mail.

Assessment			
Methodologies	Competencies	Description	**Qualification**
Online forum	B1 C2 C6	Participation of active form and proposal of new threads of conversation in the forum	20

Collaborative learning	A4 A5 A8 A10 B1 B3 B8 B9 C1 C8	Concretion and clarity in the contents Consults of different sources of information	30
Binary questions	A4 A5 A8 A10 B1 B3	To minimum qualification to surpass to matter will be of 5 points	30
Document analysis	A4 A5 A8 A10 B1 B3 B8 B9 C2	His contribution is not a reproduction of the text of origin, but a coherent synthesis in which only they appear the most important appearances of the same	20

Assessment comments

Sources of information	
Basic	- (2013). Genetic Improvements in Agriculture. The Plant Cell - (2010). The past, present and future of crop genetic modification. New Biotechnology Volume 27, Number 5 - (2014). A Really Useful Pathogen, Agrobacterium tumefaciens.. American Society of Plant Biologists. The Plant Cell - (2000). Plantas transgénicas. Preguntas y respuestas. Boletín de la Sociedad Española de Biotecnología - Serrano M, Piñol T, (1991). Biotecnología vegetal. Ed. Síntesis - Caballero JL, Muñoz J, Valpuesta V, (2001). Introducción a la biotecnología vegetal: métodos y aplicacio. Ed.Publicaciones y Obra Social y Cultural Cajasur - Slater A., Scout N, Fowler M., (2003). Plant biotecnology: the genetic manipulation of plants. Ed. Oxford UniversityPress - Reinhard Renneberg, Darja SüBbier (2008). Biotecnologíapara principiantes. Reverte - Taiz, L., Zeiger, E., Moller, A.M. & Murphy, A. (2022). Plant Physiology and Development. ed. Oxford University Press.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Cellular Techniques/610441001 Molecular Techniques/610441002
Subjects that are recommended to be taken simultaneously
Molecular Plant-Pathogen Interaction Mechanisms/610441019
Subjects that continue the syllabus
Other comments
Program Green Campus Empower of Sciences To help to achieve some sustainable immediate surroundings and fulfil with the point 6 of the Environmental Statement of the faculty of Sciences (2020), the documentary works that realise in this matter: to. They will request mostly in virtual format and computer support b. To realise in paper: -they will not employ plastic -will realise impressions to double expensive -will employ paper recycled -will avoid the realisation of drafts