Teaching Guide				
Identifying Data				2023/24
Subject (*)	Vegetal biotechnology		Code	610475303
Study programme	Mestrado Universitario en Biotecnoloxía Avanzada			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	BioloxíaDepartamento profesorado máster			
Coordinador	Pomar Barbeito, Federico	E-mail	federico.pomar@udc.es	
Lecturers	Pomar Barbeito, Federico	E-mail	federico.pomar@udc.es	
Web	masterbiotecnologiaavanzada.com/			
General description	In this subject also participates teachers of the UVIGO: Pedro Pablo Gallego Vegas (email: pgallego@uvigo.es) Striking Mercedes Medina (email: medina@uvigo.es) Maria Esther Barreal Modroño (email: edesther@uvigo.es) This course covers the history and basic concepts of plant biotechnology: in vitro culture of cells, tissues and organs of plant, crop types and their applications and genetic engineering. The course includes a comprehensive wiew of the transformation plant genetics (concepts, processing methods and the use of genetically modified plants), the manipulation of plants and plant improvement. The students analyze in depth the impact of biotechnology and Genetically modified organisms on the society, reviewing aspects such as patents, regulations, ethical risks. The methodology used for the acquisition of knowledge will be the presentation and discussion, (Expository strategy or master) but included, innovatively Based Learning Problems (BLP), by which the student will have to work in a practical case, which allowed acquire skills course, being the protagonist of the learning process (strategy discovery and construction).			

Study programme competences / results	
Code	Study programme competences / results
A21	Coñecer os recursos microbianos, vexetais e animais de interese biotecnolóxico así como as súas aplicacións na industria alimentaria e agropecuaria.
A24	Coñecer as estratexias de produción e mellora de alimentos por métodos biotecnolóxicos.
B1	Capacidade de análise e síntese (localización de problemas e identificación das causas e a súa tipoloxía).
B2	Capacidade de organización e planificación de todos os recursos (humanos, materiais, información e infraestruturas).
B3	Capacidade de xestión da información (con apoio de tecnoloxías da información e as comunicacións).
B4	Capacidade de planificación e elaboración de estudos técnicos en biotecnoloxía microbiana, vexetal e animal.
B5	Capacidade de identificar problemas, buscar solucións e aplicalas nun contexto biotecnolóxico profesional ou de investigación.
B6	Capacidade de comunicación oral e escrita dos plans e decisións tomadas.
B7	Capacidade para formular xuízos sobre a problemática ética e social, actual e futura, que propón a Biotecnoloxía.
B8	Capacidade de comunicación eficazmente coa comunidade científica, profesional e académica, así como con outros sectores e medios de comunicación.
B9	Capacidade de Traballo en equipo multidepartamental dentro da empresa.
B10	Capacidade de Traballo nun contexto de sostibilidade, caracterizado por: sensibilidade polo medio ambiente e polos diferentes organismos que o integran así como concienciación polo desenvolvemento sostible.
B11	Racionamento crítico e respecto profundo pola ética e a integridade intelectual.
B12	Adaptación a novas situacións legais, ou novidades tecnolóxicas así como a excepcionalidades asociadas a situacións de urxencia.
B13	Aprendizaxe autónoma.

B14	Liderazgo e capacidade de coordinación.
B15	Sensibilización cara á calidade, o respecto medioambiental e o consumo responsable de recursos e a recuperación de residuos.
C4	Acting as a respectful citizen according to democratic cultures and human rights and with a gender perspective.
C7	Developing the ability to work in interdisciplinary or transdisciplinary teams in order to offer proposals that can contribute to a sustainable environmental, economic, political and social development.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Knowing the plant resources, their biotechnological applications, the production processes and improved plant and food by biotechnological methods	AC21 AC24	BC3 BC15	CC7
Having an integrated approach plant metabolism and the control of gene expression in order to address its handling, improvement and/or maintenance	AC24	BC7	
Know and use the techniques of in vitro culture and cell engineering of plants		BC15	
Knowing how to find and get information from the major databases on patents related to plant biotechnology		BC3	
Possessing a broad knowledge of the legal and ethical aspects related to plant biotechnology.		BC7	
Promoting the ability to manage information related to plant biotechnology and its transmission		BC1 BC3 BC6 BC7 BC8	
Understanding the interest, the advantages and requirements of working in multidisciplinary teams, organizing and planning appropriate resources.		BC2 BC9	CC4 CC7
Promoting the ability to identify problems and find solutions and to plan and prepare technical studies within the field of plant biotechnology		BC4 BC5	CC7
To promote, within the plant biotechnology industry, labor respectful to the environment.		BC10 BC11	CC7
Promote autonomous learning ability, leadership, adaptation to new situations as well as sensitivity to quality and by respect for the environment in the field of plant biotechnology		BC12 BC13 BC14 BC15	CC7

Contents	
Topic	Sub-topic
Topic 1	Introduction to the training program: content, sources and objectives, methodology and assessment
Topic 2	Plant Biotechnology: basic concepts. History.
Topic 3	In vitro culture of cells, tissues and organs vegetables. Types of crops. Biotechnological applications.
Topic 4	Plant genomes and plant health resources in plant production
Topic 5	Plant genetic transformation: concepts, methods, processing and use of biotechnology genetically modified plants.
Topic 6	Plant breeding. Phytohormones and its agricultural applications
Topic 7	Plant Biotechnology and society: patents, regulations, ethical issues and risks
BLP	BLP

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours

Introductory activities	B1	1	0	1
Guest lecture / keynote speech	A21 A24 B15	11	11	22
Case study	A21 A24 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 C4 C7	2	28	30
Oral presentation	B3 B4 B6 B7 B8	1	4	5
Mixed objective/subjective test	A21 B1 B7 B9	1	0	1
Case study	A21 B15 B14 B13 B12 B11 B10 B9 B8 B7 B5 B4 B3 B2 B1 C4 C7	10	3	13
Personalized attention		3	0	3
(*)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	Contact students / teachers. Presentation of the training program: teaching methodology, planning, development. presentation of the practical case. Assessment system.
Guest lecture / keynote speech	The explanation of the main concepts will complemented by an active discussion with the student, through questions to integrate, establish and clarify the key concepts.
Case study	Analysis of a case study with the purpose of the student, working in small groups, star in his self-learning guided by the teacher / tutor (learning strategy for discovery and construction). The case poses a problem complex, similar to those that students will face in real life, and for whose solution will have to be formed in theory and in practice. In other words, aims to discover knowing and not about the problem, and it should look information, selects, organizes, evaluates, interprets, integrates and finally proposes solutions using the scientific method.
Oral presentation	Prueba que consiste en la presentación del Caso respondiendo a las preguntas planteadas por el alcalde y las personas interesadas.
Mixed objective/subjective test	Prueba que incluve la autoevaluación del trabajo en equipo, que sirve para ponderar el trabaio realizado por cada miembro.
Case study	Oral presentation, using a computer program presentation of the work. Will be held in groups formed by 4-5 people.

Personalized attention	
Methodologies	**Description**
Case study	Personalized tutorials will be held 1 hour per working group (physically or by videoconference): first for presentation of case study, second for monitoring and the last one for its completion.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**

Case study	A21 A24 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 C4 C7	Delivery of a written document to be resolved the issue raised in the case study. Oral presentation, using a computer program presentation of the work. Will be held in groups formed by 4-5 people.	40
Oral presentation	B3 B4 B6 B7 B8	Prueba que consiste en la presentación del Caso respondiendo a las preguntas planteadas por el alcalde y las personas interesadas. Se emplea una rúbrica para valorar los contenidos de la misma, que está disponible para los estudiantes desde el inicio de la materia. La nota es individual.	40
Mixed objective/subjective test	A21 B1 B7 B9	Prueba que incluve la autoevaluación del trabajo en equipo, que sirve para ponderar el trabaio realizado por cada miembro. Se emplea una rúbrica para valorar los contenidos de la misma, que está disponible para los estudiantes desde el inicio de la materia. La calificación es individual y pondera la obtenida en la memoria.	20

Assessment comments
Students who fail the assessment must redo the practical case basis, with the written and oral with the resolution of the same. Any academic dishonesty will be penalised in accordance with the provisions of the current UDC regulations.

Sources of information	
Basic	Reinhard Renneberg, Darja SüBbier , Biotecnología para principiantes , 2008, Reverte Henry RJ, Plant conservation genetics , 2006, Food Products Press Herman, EB, Micropropagation systems, techniques and applications : 2006-2010 , 2010, Agritech Consultants Slater A., Scout N, Fowler M., Plant biotecnology: the genetic manipulation of plants, 2003, Ed. Oxford University Press Caballero JL, Muñoz J, Valpuesta V, Introducción a la biotecnología vegetal: métodos y aplicaciones, 2001, Ed. Publicaciones y Obra Social y Cultural Cajasur Serrano M, Piñol T, Biotecnología vegetal, 1991, Ed. Síntesis
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Genetic Engineering and Transgenetics /610475101 Cellular and Tissue Engineering/610475102 Organisation and management of a laboratory/610475201 Legal and ethical aspects in Biotechnology/610475203
Subjects that are recommended to be taken simultaneously
Environmental management and floor and air technology/610475403
Subjects that continue the syllabus
Master Thesis/610475006 External Practicals/610475007
Other comments
Se recomienda conocimientos de inglés, a nivel de comprensión de fuentes de información científica (libros y documentos) escritas para el correcto aprendizaje de las competencias de la materia