



## Teaching Guide

Identifying Data					2023/24
Subject (*)	Cellular and Tissue Engineering		Code	610475102	
Study programme	Mestrado Universitario en Biotecnoloxía Avanzada				
Descriptors					
Cycle	Period	Year	Type	Credits	
Official Master's Degree	1st four-month period	First	Obligatory	3	
Language	SpanishGalicianEnglish				
Teaching method	Face-to-face				
Prerequisites					
Department	BiologíaDepartamento profesorado másterFisioterapia, Medicina e Ciencias Biomédicas				
Coordinador	Arufe Gonda, María del Carmen	E-mail	maria.arufe@udc.es		
Lecturers	Arufe Gonda, María del Carmen Bernal Pita da Veiga, María de los Ángeles Fafián Labora, Juan Antonio	E-mail	maria.arufe@udc.es angeles.bernal@udc.es juan.labora@udc.es		
Web	masterbiotecnologiaavanzada.com/				
General description	<p><b>IMPORTANTE:</b> Las plataformas de guías docentes de las dos universidades aun siendo similares tienen ligeras diferencias. Ante cualquier discrepancia entre las guías se tendrá en cuenta la publicada en la página web del máster.</p> <p><b>EN LA DOCENCIA DE LA MATERIA PARTICIPAN TAMBIÉN LA SIGUIENTE PROFESORA DEL INIBIC (INSTITUTO DE INVESTIGACIÓN BIOMÉDICA DE A CORUÑA):</b></p> <p>M<sup>ª</sup> Nieves Doménech García Esther Rendal Vázquez</p> <p>La ingeniería celular y tisular constituye un área emergente en la citología e histología humana de nuestros días. Surge como resultado de la progresiva aplicación biotecnológica de las células vegetales y animales, así como de los nuevos tejidos construidos a partir de conocimiento derivado del desarrollo embrionario, de los novedosos modelos desarrollados in vitro, y de la unión de ambos tipos de aproximaciones. Se trata de un área en expansión que asentada en los conocimientos básicos de la citología e histología tiene por objetivo cultivar, conservar, caracterizar y modificar células vegetales y/o animales y construir tejidos nuevos, funcionalmente activos, a partir de células procedentes de cultivos desarrollados previamente y de biomateriales de distinta naturaleza que sirven como soporte o andamiaje.</p>				

## Study programme competences / results

Code	Study programme competences / results
A1	Saber buscar e analizar a biodiversidade de microorganismos, plantas e animais así como seleccionar os de maior interese biotecnolóxico (aplicado).
A2	Ter unha visión integrada do metabolismo e do control da expresión xénica para poder abordar a súa manipulación.
A3	Coñecer as aplicacións biotecnolóxicas dos microorganismos, plantas e animais e saber manipularlos de cara á súa aplicación biotecnolóxica.
A4	Coñecer e saber usar as técnicas de cultivo e a enxeñaría celular.
A5	Coñecer os principios da xenómica e a proteómica.
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 aplicarlas nun contexto biotecnolóxico profesional ou de investigación.
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.
B13	Aprendizaxe autónoma.
B15	Sensibilización cara á calidade, o respecto medioambiental e o consumo responsable de recursos e a recuperación de residuos.



C3	Using ICT in working contexts and lifelong learning.
C4	Acting as a respectful citizen according to democratic cultures and human rights and with a gender perspective.
C5	Understanding the importance of entrepreneurial culture and the useful means for enterprising people.
C6	Acquiring skills for healthy lifestyles, and healthy habits and routines.
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.
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 / results		
Handling the main techniques to obtain and maintain different cell cultures	AC1 AC3	BC1 BC3 BC15	CC3 CC6 CC7 CC8
Handling equipment for the cellular and molecular techniques	AC1 AC2 AC3 AC4 AC5	BC1 BC3 BC5	CC3 CC4 CC6 CC7 CC8
To use different techniques protocols	AC3 AC4	BC1 BC2 BC3 BC4 BC5 BC10 BC13	CC3 CC8
Know the applications of the various techniques in cell culture	AC3 AC4 AC5	BC10 BC11 BC13	CC3 CC5 CC7 CC8

Contents	
Topic	Sub-topic
Introduction to the cellular crop animal. Generalities on the technicians of cellular crop.	Introduction to the cellular crop animal. Methods of isolation of cells from blood or tissues. Work in sterile situations. Generalities on the technicians of cellular culture.
Methods of conservation and characterisation of cellular cultures.	Methods of culture, of growth, of differentiation and of freezing. Methods of characterisation of cellular cultures
Analysis and phenotypic of the cells.	Histomorphological analysis of the cells. Phenotypic by immunohistochemistry. Phenotypic by Cytometry of flow
Introduction in the engineering tissue: concept and perspectives.	Introduction in the engineering tissue. Supports and biomaterials. Clinical applications. Therapeutic perspectives
Plant cell cultures	In vitro cultures of plant material. Basic methodology. Cellular cultures. Plant regeneration

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



Laboratory practice	A1 A3 A4 B1 B2 B3 B4 B5 B10 C3 C4 C5 C6 C7 C8	8	8	16
Multiple-choice questions	A1 A2 A3 A4 A5 B10 B11 B13 B15	2	10	12
Workbook	B1 B3 C6 C7 C8	1	2	3
Guest lecture / keynote speech	B1 B3 B5	14	28	42
Personalized attention		2	0	2

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
Laboratory practice	They develop technicians of current use in biomedical investigation, that complement the knowledges given in the session magistral.
Multiple-choice questions	Examination type test, in which each question consists in 4 affirmations of which only one is correct.
Workbook	Reading of a notable scientific article and related with the matter given
Guest lecture / keynote speech	Participatory theoretical class, favouring the exchange of opinions, the debate and the answer of the questions formulated by the student

Personalized attention	
Methodologies	Description
Laboratory practice	Treat of a group reduced of students, it is possible the resolution of doubts and the follow-up individualize during the same process of learning. In particular, the magistral session is participatory, favouring the exchange of opinions, the interchange of ideas and the answer of the questions formulated. The practices of laboratory are revised at all times by the teachers and, if necessary, by the group of investigation in which it integrates the student.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Laboratory practice	A1 A3 A4 B1 B2 B3 B4 B5 B10 C3 C4 C5 C6 C7 C8	They develop technicians of current use in biomedical investigation, that complement the knowledges given in the magistral session	40
Guest lecture / keynote speech	B1 B3 B5	Exame tipo test, no que cada pregunta consiste en 4 afirmacións das que só unha é correcta.	10
Multiple-choice questions	A1 A2 A3 A4 A5 B10 B11 B13 B15	Examination type test, in which each question consists in 3 affirmations of which only one is correct.	40
Workbook	B1 B3 C6 C7 C8	Entrega das memorias das prácticas	10

Assessment comments
To pass the matter, it is necessary to obtain as a whole a minimum of 5 on 10 and, in each methodology evaluated, a minimum of 2,5 on 5.

Sources of information



<b>Basic</b>	<p>R. Ian Freshney. Culture of animal cells. A manual of Basic Research. Ed. Wiley-Liss and sons. Inc. Publications. New York Irving L., Weissman and Judith A. Shizuru. The origins of the identification and isolation of hematopoietic stem cells, and their capability to induce donor-specific transplantation tolerance and treat autoimmune diseases. Blood, Vol112, Number 9 Tiziano Barberi and Lorenz Studer. Methods in enzymology. Vol. 418. Differentiation of embryonic stem cells. Cap. 12: Mesenchymal Cells. Ferraris. Histologia, Embriologia E Ingeniería Tisular (Spanish Edition), 2009. Ed. Medica Panamericana. Benítez Burraco, A. 2005. Avances recientes en Biotecnología vegetal e ingeniería genética de plantas. Editorial Reverté. Loyola-Vargas, VM e Vázquez-Flota, F. 2006. Plant cell culture protocols- Humana Press 2 Edition. Trigiano, R.N. e Gray, DJ. 2004. Plant development and biotechnology. CRC</p> <p><a href="http://campus.usal.es/~histologia/">http://campus.usal.es/~histologia/</a></p>
<b>Complementary</b>	

## Recommendations

### Subjects that it is recommended to have taken before

Genetic Engineering and Transgenetics /610475101

### Subjects that are recommended to be taken simultaneously

### Subjects that continue the syllabus

Vegetal biotechnology/610475303

Animal biotechnology/610475304

### Other comments

Since it splits of the bibliography recommended for this matter finds in English, is advisable to have knowledges of this language, at least, to level of understanding of texts written.

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.