



## Teaching Guide

Identifying Data				2019/20
<b>Subject (*)</b>	Animal biotechnology	<b>Code</b>	610475304	
<b>Study programme</b>	Mestrado Universitario en Biotecnoloxía Avanzada			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
<b>Language</b>	Spanish			
<b>Teaching method</b>	Face-to-face			
<b>Prerequisites</b>				
<b>Department</b>	Bioloxía			
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<b>General description</b>	This subject intends to introduce students to the basic aspects of animal biotechnology. Main aspects involve the understanding of the fundamentals of molecular tools for the study of genomes and how molecular markers allow for species identification, population analysis and development of genetic improvement programs. Also the knowledge of tools and application of technologies for chromosomal manipulation and in vitro fertilization.			
<b>Contingency plan</b>				

## Study programme competences

Code	Study programme competences
A1	Saber buscar e analizar a biodiversidade de microorganismos, plantas e animais así como seleccionar os de maior interese biotecnolóxico (aplicado).
A5	Coñecer os principios da xenómica e a proteómica.
A7	Saber buscar, obter e interpretar a información das bases de datos biolóxicas: xenómicas, proteómicas, transcriptómicas e metabolómicas e utilizar as ferramentas básicas da bioinformática.
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 aplicarlas 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 excepcións 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.

## Learning outcomes



Learning outcomes	Study programme competences		
Ability to identify the different biotechnological applications that animal resources have in the sector of food and agriculture.	AC1 AC5 AC7 AC21 AC24	BC1 BC2 BC3 BC5 BC7 BC8 BC10 BC12 BC13 BC15	
Ability to develop production strategies based on food improvement by biotechnological methods.	AC1 AC5 AC7 AC21 AC24	BC1 BC2 BC3 BC4 BC5 BC6 BC7 BC8 BC9 BC10 BC11 BC12 BC13 BC14 BC15	

Contents	
Topic	Sub-topic
Genomics and its application in the exploitation of natural animal variability.	Structural and functional genomics. Animal genomes. Paradox of C-Value. Genomic regions and their variation. Gene identification. Linkage maps.
Breeding and marker-assisted selection	Molecular makers: types, characteristics, development and analysis. Selection of quantitative traits in animals. Detection and analysis of QTLs. Use of identified genes in genetic improvement. Genome-wide association studies. Genomic selection.
Control of reproduction and assisted reproductive technologies in animals.	In vitro fertilization and embryo production Micromanipulation of gametes and embryos Sex determination.
Chromosome manipulation in fish and shellfish	Poliploidy. Gynogenesis. Androgenesis. Monosex populations. Production of clones.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Laboratory practice	A21 A24 B9	8	0	8
Objective test	A1 A5 A7 B1 B3 B4 B5 B6	0	20	20



Supervised projects	A1 A5 B1 B2 B6 B7 B8 B10 B13 B14	0	10	10
Guest lecture / keynote speech	A24 A21 B11 B12 B15	20	16	36
Personalized attention		1	0	1

(\* )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	Visit a laboratory where biotechnology tools are used for animal reproduction
Objective test	This test will be used to assess learning and knowledge, skills and abilities acquired in this subject.
Supervised projects	Students, in groups or individually, will write an essay about some aspect of the subject
Guest lecture / keynote speech	Lectures will be given by the course teachers in order to convey a general knowledge of the subject. Lectures will be held by videoconference and dialogue between students and teachers will be encouraged.

Personalized attention	
Methodologies	Description
Supervised projects	Custom and group tutorial sessions are possible, either in person or via videoconference, for advice on jobs and to review any subject-related issue.  In the case of justified exceptional circumstances, additional measures may be taken, so that the student can pass the subject.

Assessment			
Methodologies	Competencies	Description	Qualification
Supervised projects	A1 A5 B1 B2 B6 B7 B8 B10 B13 B14	Originality, degree of understanding of the topic, ability to synthesize and review and consulted literature sources will be evaluated.	20
Guest lecture / keynote speech	A24 A21 B11 B12 B15	Attitude attendance and participation in the dialogues promoted by teachers will be evaluated.	30
Laboratory practice	A21 A24 B9	Attendance at practices will be assessed. Students will respond to questionnaires on practice-visits they make.	10
Objective test	A1 A5 A7 B1 B3 B4 B5 B6	The objective test will allow the student to demonstrate mastery of the knowledge acquired on basic issues of the subject. It will consist of several short questions about the contents explained by the teachers.	40

Assessment comments
To be assessed it is necessary to take the objective test. Preferably, first class honors will be awarded in June among students with a score of 9 or higher. The grade of Non Attendance (NP) will be applied to students that do not complete any of the proposed activities.

Sources of information



<b>Basic</b>	<ul style="list-style-type: none"> <li>- Lynch, M (2007). The Origins of Genome Architecture. Sinauer Assoc., Sunderland</li> <li>- Lewin B. (2008). Genes IX. McGraw Hill</li> <li>- Allis, D., Jenuwein, T., Reinberg, D. &amp; M.T. Caparros (2007). Epigenetics. Cold Spring Harbor Laboratory Press</li> <li>- Ruvinsky, A., Marshall-Graves, J.A. (2005). Mammalian Genomics. CABI Publishing</li> <li>- Piferrer, F., Felip, A., Cal, R.M. (2007). Inducción de la triploidia y la ginogénesis para la obtención de peces estériles y poblaciones monosexo en acuicultura . En Genética y genómica en acuicultura. Observatorio Español de Acuicultura, Madrid.</li> <li>- Piferrer, F., Beaumont, A., Falguière, J.C., Flajshans, Haffray, P., Colombo, L (2009). Polyploid fish and shellfish: production, biology, applications to aquaculture for performance improvement and genetic containment. Aquaculture 293: 125-156</li> <li>- Cortés Rubio, E.&amp; Morcillo Ortega G. (2002). Ingeniería Genética. Manipulación de genes y genomas. Universidad Nacional de Educación a Distancia</li> <li>- Thieman W.J. &amp; Palladino M.A. (2009). Introduction to Biotechnology Second Edition. Pearson International Edition</li> <li>- Smith J.E. (2004). Biotecnología . Acribia S.A.</li> </ul>
<b>Complementary</b>	

### Recommendations

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

Genetic Engineering and Transgenetics /610475101  
 Cellular and Tissue Engineering/610475102  
 Genomics and Proteomics/610475103

#### Subjects that are recommended to be taken simultaneously

Organisation and management of a laboratory/610475201  
 Legal and ethical aspects in Biotechnology/610475203  
 Analysis of foodstuff. food security and traceability /610475302

#### Subjects that continue the syllabus

Assisted reproduction technology/610475502

#### Other comments

Students are recommended to have the necessary English level to understand scientific information sources for the proper learning of the skills of the subject.

(\*)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.