



## Teaching Guide

Identifying Data					2023/24
Subject (*)	Animal biotechnology	Code	610475304		
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	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Bioloxía				
Coordinador	Insua Pombo, Ana Maria	E-mail	ana.insua@udc.es		
Lecturers	Insua Pombo, Ana Maria	E-mail	ana.insua@udc.es		
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General description	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.				

## 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 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.
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



Ability to identify the different biotechnological applications that animal resources have in the sector of food and agriculture.	AC21 AC24	BC1 BC2 BC3 BC5 BC7 BC8 BC10 BC12 BC13 BC15	CC4 CC7
Ability to develop production strategies based on food improvement by biotechnological methods.	AC21 AC24	BC1 BC2 BC3 BC4 BC5 BC6 BC7 BC8 BC9 BC10 BC11 BC12 BC13 BC14 BC15	CC4 CC7

Contents	
Topic	Sub-topic
Genomics and its application in the exploitation of natural animal variability.	Animal biotechnology and Genomics. Physical maps and genetic maps. Sequencing of animal genomes: strategies, assembly and annotation of genes. Animal genomes. Genome variation: SNPs and structural variants.
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 / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A21 A24 B11 B12 B15	14	21	35
Laboratory practice	A21 A24 B9 C4 C7	4	2	6
ICT practicals	A21 A24 B2 B3 B12 C4 C7	3	6	9



Supervised projects	A21 A24 B1 B2 B6 B7 B8 B10 B11 B13 B14 C4 C7	0	12	12
Objective test	A21 A24 B1 B3 B4 B5 B6 B15	2	10	12
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
Guest lecture / keynote speech	Presentation of the general contents of the subject. Student participation will be encouraged.
Laboratory practice	Visit to a company where biotechnology tools are used in animals.
ICT practicals	Knowledge application activity based on the use of computer resources.
Supervised projects	Students, in groups or individually, will write an essay about some aspect of the subject
Objective test	This test will be used to assess the knowledge acquired in this subject. It may consist of the following types of questions: multiple choice, true/false, short answer, essay, and/or association.

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.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
ICT practicals	A21 A24 B2 B3 B12 C4 C7	The degree of understanding of analyzes carried out and the skill with bioinformatics tools used will be evaluated.	25
Supervised projects	A21 A24 B1 B2 B6 B7 B8 B10 B11 B13 B14 C4 C7	Originality, degree of understanding of the topic, ability to synthesize and critique, and consulted literature sources will be evaluated.	25
Laboratory practice	A21 A24 B9 C4 C7	Attendance and a brief report on the visit will be evaluated.	10
Objective test	A21 A24 B1 B3 B4 B5 B6 B15	The objective test will allow the student to demonstrate mastery of the knowledge acquired on basic issues of the subject.	40

Assessment comments
<p>Students may opt for continuous evaluation, according to the criteria specified in "Assessment", or for taking a global test with questions related to the theoretical and practical aspects of the subject.</p> <p>In case of opting for continuous evaluation, it is necessary to take the objective test in order to be evaluated.</p> <p>Preferably, first class honors will be awarded in June among students with a score of 9 or higher.</p> <p>The grade of "Non Attendance" (NP) will be applied to students that do not complete any of the proposed activities.</p> <p>For students with recognition of part-time dedication and academic dispensation of exemption from attendance, measures may be adopted to avoid prejudicing their grade, such as flexibility in the delivery of work and tutoring schedule.</p> <p>Fraudulent performance of tests or evaluation activities will directly imply a failing grade (numerical grade of 0) in both the first and second opportunity of the corresponding academic year. If the fraud takes place in the second opportunity, the grade of the first opportunity will be modified in the grade report.</p>

Sources of information



<b>Basic</b>	<p>- Piferrer, F., Felip, A., Cal, R.M. (2007). Inducción de la triploidía 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.</p> <p>- 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</p> <p>- Mondal, S., Singh, R.L. (2021). Advances in animal genomics. Academic Press</p> <p>- Singh, B., Mal, G., Gautam, S.K., Mukesh, M. (2019). Advances in animal biotechnology. Springer</p> <p>- Wang, H-P., Piferrer, F., Chen, S. (Eds.) (2019). Sex control in aquaculture. Wiley Blackwell</p> <p>Consultar Campus Virtual/Moovi para fontes de información adicionais.</p>
<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

Recommendations:Students are recommended to have the necessary English level to understand scientific information sources.Follow the development of the course regularly.Check Campus virtual/Moovi and email to obtain materials and to know the schedule of activities.Attend tutorials to resolve any questions or difficulties that may arise.Consult the recommended bibliography.Gender perspective:In this subject, the gender perspective will be taken into account, sexist attitudes will not be tolerated and the values of respect and equality will be promotedGREEN CAMPUS FACULTY OF SCIENCES PROGRAMTo help achieve a sustainable immediate environment and comply with point 6 of the "Environmental Declaration of the Faculty of Sciences (2020)", the documentary works carried out in this matter:a. They will be requested mainly in virtual format and computer support.b. If done on paper:- Plastics will not be used.- Double-sided prints will be made.- The preparation of drafts will be avoided.

(\*)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.