UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2018/19
Subject (*)	Molecular Techniques		Code	610441002
Study programme	Mestrado Universitario en Bioloxía Molecular , Celular e Xenética			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatory	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Rodriguez Torres, Ana Maria	E-mail	ana.rodriguez.torres@udc.es	
Lecturers	Diaz Varela, Jose Lamas Maceiras, Mónica Martinez Martinez, M. Luisa Pomar Barbeito, Federico Rodriguez Torres, Ana Maria	E-mail	jose.diaz.varela@udc.es monica.lamas@udc.es m.l.martinez@udc.es federico.pomar@udc.es ana.rodriguez.torres@udc.es	
Web	ciencias.udc.es/masters-bcm/master-en-biología-molecular-y-celula			
General description				

Study programme competences	
Code	Study programme competences
A1	Skills of using usual techniques and instruments in the cellular, biological and molecular research: that are able to use techniques and instruments as well as understanding potentials of their uses and applications.
A2	Skills of working in a sure way in the laboratories knowing operation handbooks and actions to avoid incidents of risk.
A3	Skills of understanding the functioning of cells through the structural organization, biochemistry, gene expression and genetic variability.
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.
A9	Skills of understanding the structure and dynamics of proteins to individual and proteomic level, as well as the techniques that are necessary to analyze them and to study their interactions with other biomolecules.
A10	Skills of modifying genes, proteins and chromosomes with biotechnological applications
A12	Skills to understand, detect and analyze the genetic variation, knowing genotoxicity processes and methodologies for its evaluation, as well as carrying out diagnosis and genetic risk studies.
A13	Skills to become a professional in health, pharmacy, veterinary, animal production, biotechnology or food sectors.
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
B2	Skills of decision making for the problem solving: that are able to apply theoretical knowledges and practical acquired in the formulation of biological problems and the looking for solutions.
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
B4	Organization and work planning skills: that are able to manage the use of the time as well as available resources and to organize the work in the laboratory.
C6	Considering critically the knowledge, technologies and the available information to solve problems with which should face.

Learning outcomes	
Learning outcomes	Study programme competences

Handle the necessary equipment for cellular and molecular techniques.	AR1 AR2		
Know the protocols used for the different techniques.	AR1 AR2		
Know the applications for the different techniques.	AR1 AR4 AR5 AR13	BR2	CC6
Consider the ways to resolve the methodological problems associated with the performance of the techniques.		BR1	
Establish the relationships between the different techniques used and its possible combination to resolve the problems.		BR1	
Interpret data from observations and measurements in the laboratory.		BR3	
Plan, design and conduct experiments related with the techniques learned.		BR2 BR4	
Maintain a critical attitude for a perfect experimental work.			CC6
Relate the chemical and structural properties of biomolecules with laboratory techniques that are most suitable for isolation, purification and characterization.	AR1 AR9	BR1 BR2	
Know in depth the possibilities and characteristics of PCR and real-time PCR.	AR2	BR3 BR4	
Understand and handle the techniques of recombinant DNA that can be used for analysis and manipulation of biomolecules.	AR1 AR2 AR8 AR10	BR2	
Use methods and techniques to detect and analyze genetic variation.	AR1 AR3 AR12	BR3	

Contents	
Topic	**Sub-topic**
Purification of Biomolecules	Principle of centrifugation technique and instrumentation. Preparative and Analytical Centrifugation. Chromatographic Techniques: principle and selection criteria. Electrophoresis: principle and types. Isoelectric focusing technique. Capillary electrophoresis.
PCR	Advanced concepts in PCR Differences between PCR and Real-time PCR Detection methods of amplicons Trial design and results analysis
Tecnology of molecular markers	Concept and single nucleotide polymorphisms (SNPs) Protein markers DNA markers based in Nucleic Acid Hibridization Pattern Multi Locus by PCR techniques DNA markers based in PCR Mono-locus Single nucleotide polymorphisms (SNPs)

Recombinant DNA	Enzymes and protocols used in recombinant DNA techniques Genomics GeneBank Expression GeneBank GeneBank analysis Transfer and Blotting techniques Sequencing techniques Site-direct mutagenesis techniques Silencing techniques Transgenic organisms: uses and applications

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A4 A5 A10 A13	14	14	28
Laboratory practice	A1 A2 A3 A12 B4	24	48	72
Supervised projects	A1 A3 A8 A9 B1 B3 B2	0	42	42
Mixed objective/subjective test	A1 A3 A9 A12 B1 B2 C6	2	4	6
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
Guest lecture / keynote speech	By the Professors or/and by the exhibition of student work
Laboratory practice	Practical classes in the laboratory; Problems solving and practical cases
Supervised projects	Research Project related with the techniques made in the laboratory. It will be develop individually under Professor?s supervisión.
Mixed objective/subjective test	Exam about theoretical and practical subjects.

Personalized attention	
Methodologies	Description
Supervised projects Guest lecture / keynote speech Laboratory practice	Personalized tutoring focused on guidance to help the students: resolving doubts and clarifications. The tutoring schedule will be indicated the first class by each Professor. The students may request an appointment and/or resolving doubts by e-mail.

Assessment			
Methodologies	Competencies	Description	Qualification
Supervised projects	A1 A3 A8 A9 B1 B3 B2	Elaboration and writing of a supervised work.	30
Laboratory practice	A1 A2 A3 A12 B4	Along the practical classes, the students will answer questions and problems, which will be part of the continuous evaluation of the course.	20

Mixed objective/subjective test	A1 A3 A9 A12 B1 B2 C6	Exam with questions in which the student must apply the knowledge and skills acquired along the course.	50

Assessment comments
.-The evaluation criteria listed will be apply to two types of registration (classroom and blended learning). .-The attendance to Practical clases is a necessary condition to be evaluated. .-The qualifications obtained with the Supervised Project and Practical Exercises will be maintained for the 2º Option (July) if the student do not pass the Final Exam in the 1º Option (January), and in the Final Qualification Records (QRs) will appear the qualification of 4. .-According to the rule of qualifications and records in Grades and Masters, the Quality Committee of the Faculty of Sciences, agreed to the recommendation to concede the ?Honors Qualification? to those students who obtained the highest marks in the 1st Option_June.

Sources of information	
Basic	- M. L. Marina, A. Ríos, M. Valcárcel (2005). Analysis and detection by capillary electrophoresis . Amsterdam : Elsevier - Westermeier, Reiner. (2005). Electrophoresis in practice : a guide to methods and applications of DNA and protein separations. Weinheim : Wiley-VCH - Weiner MP, Gabriel SB, Stephens JC, (2007). Genetic variation: a laboratory manual. Cold Spring harbor Laboratory Press, New York. - Brown TA (2008). Genomes (3º ed). . Médica Panamericana, Buenos Aires. - Morteza G. Khaledi (1998). High-performance capillary electrophoresis theory, techniques, and applications . New York : John Wiley & Sons, - Nuez F, Carrillo JM, (2000). Los marcadores genéticos en la mejora vegetal.. Universidad Politécnica de Valencia. - Avise CJ (2004). Molecular markers, natural history, and evolution (2ª ed.). . Sinauer Associates, Sunderland, MA. - Keith Wilson and John Walker (1995). Principles and Techniques of Practical Biochemistry. Cambridge, University Press - Dorak, T. (2007). Real-Time PCR. Routledge Taylor and Francis. - Mackay, I. M. (2007). Real-time PCR in microbiology : from diagnosis to characterisation. Norfolk: Caister Academic Press. - Edwards, K., Logan J. & Saunders, N. (2004). Real-time PCR: an essential guide.. Horizon bioscience. - Logan J, Edawards K, Saunders N. (2009). Real-Time PCR: Current Technology and applications.. Caister Academic Press
Complementary	Además se proporcionarán artículos científicos de revisión sobre los temas tratados en la asignatura en la plataforma virtual Moodle

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(*)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.