UNIVERSIDADE DA CORUÑA

Teaching Guide					
Identifying Data					2014/15
Subject (*)	Xenómica			Code	610441014
Study programme	Mestrado Universitario en Bioloxía Molecular , Celular e Xenética				
Descriptors					
Cycle	Period	Year		Type	Credits
Official Master's Degree	2nd four-month period	First		Optativa	3
Language	SpanishGalicianEnglish				
Prerequisites					
Department	Bioloxía Celular e Molecular				
Coordinador	Becerra Fernandez, Manuel		E-mail	manuel.becerra@udc.es	
Lecturers	Becerra Fernandez, Manuel Vila Taboada, Marta		E-mail	manuel.becerra@udc.es marta.vila.taboada@udc.es	
Web					
General description	Denomínase xenómica ao estudo integral do funcionamento, evolución e orixe dos xenomas. A xenómica utiliza coñemenetos derivados de distintas disciplinas como xenética, bioloxía molecular, bioquímica, informática, estatística, matemáticas e física. A diferenza da xenética clásica que a partires dun fenotipo (xeralmente mutante) procura o xene ou xenes responsables dese fenotipo, a xenómica ten como obxectivo predicir a función dos xenes a partir da súa secuencia ou das súas interaccións con outros xenes. As denominadas "ciencias ómicas" están na vangarda da ciencia, feito debido ás posibilidades abertas polas novas tecnoloxías de secuenciación masiva, aos avances en bioinformática e aos algoritmos cada vez máis sofisticados para análise de xenomas completos.				

Study programme competences	
Code	Study programme competences
A3	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.
A5	Skills of understanding the functioning of cells through the structural organization, biochemistry, gene expression and genetic variability.
A15	Skills of using Biocomputer science tools at the level of user.
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
B2	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.
B3	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.
B5	Correct oral and written communication on scientific topics in the native language and at least in another International diffusion language.
B9	Skills of preparation, show and defense of a work.
C2	Skills of dominating the oral form expression and compression and written of a foreign language.
C3	Skills of Using basic tools of the information technologies and communications (ICT) necessary to the exercise of his profession and for the apprenticeship over his life.
C8	Considering the importance that the investigation has, the innovation and the technological development in the socioeconomic advance and cultural of the society.

Learning outcomes			
Subject competencies (Learning outcomes)	Study programme competences		
To learn the basics of the different molecular techniques used in genomics, with particular emphasis in NGS	AR1 AR11	BR1 BR5	CC2 CC3
To acquire an updated view about the current scope and future perspectives of structural, functional and evolutionary genomics	AR1 AR11	BR1 BR5 BR9	CC2 CC3 CC8

To understand how genomes evolve and how molecular and bioinformatic tools are used for that purpose	AR1 AR3 AR11	BR1 BR5 BR9	CC2
DNA microarrays: experimental set up and data analysis.	AR1 AR3 AR11	BR1 BR2 BR3	CC3

Contents	
Topic	**Sub-topic**
Genome organisation:	Structure of prokaryote and eukaryote genomes. Genome size and C-value. Gene families. Repetitive DNA. Genomes of model organisms. Organelle genomes. Evolutionary Genomics.
Techniques:	Sequencing strategies and methodologies. Linkage and phyical mapping. Assembly and annotation. ADN microarrays: methodology, types of platforms, experimental set up, data analysis.
Bioinformatics:	Genomic databases. Large-scale genomic projects. Gene expression analysis and microarrays. Software for cluster and correspondence analyses.

Planning			
Methodologies / tests	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	10	18.62	28.62
Oral presentation	5	3	8
Events academic / information	1	3	4
ICT practicals	10	20	30
Objective test	2	0	2
Personalized attention	2.38	0	2.38
(*)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	Active lecturing.
Oral presentation	Each student will have to summarize in up to 15 minutes the content of a review paper. Readings assignments will be made available three weeks in advance via MOODLE.
Events academic / information	During the term, a seminar speaker, with expertise in Genomics, is invited as a guest lecturer. Students are required to attend this seminar and read the paper assigned (via MOODLE) for this activity.
ICT practicals	OUr 10-hour, computer lab curriculum was developed to accompany the lecture course in Genomics. The students work on their own web-based investigations and present their results to each other (active learnning).
Objective test	Written exam.

Personalized attention	
Methodologies	**Description**
Oral presentation ICT practicals	instructors will typically be available via email. Students can arrange for in-person tutoring sessions.

Assessment		
Methodologies	**Description**	**Qualification**

Guest lecture / keynote speech	Attendance and active learning. Evaluation of this activity aims at checking the acquisition of the following competencies: A1, A11, B1, C2 and C8.	10
Oral presentation	Summarising and communication skills. Evaluation of this activity aims at checking the acquisition of the following competencies: A1, A11, B1, B5, B9, C2 and C8.	20
ICT practicals	Attendance and active learning. A brief written assignment will be required: summarising and writting skills will be assessed. Evaluation of this activity aims at checking the acquisition of the following competencies: A1, A3, A11, B1, B2, B3, B5, C2, C3 and C8.	20
Objective test	The exam will evaluate items discussed in the aforementioned activities, as well as the acquisition of the following competencies: A1, A11, B1 and B3.	40
Events academic / information	Attendance and participation in the final discussion. Evaluation of this activity aims at checking the acquisition of the following competencies: A1, A11, B1, B5, C2 and C8.	10

Assessment comments
Mark "A with distinction" will only be awarded to outstanding students passing the subject in June.

Sources of information	
Basic	- McLachlan, G. J., Do, K-A., Ambroise, C (2004). Analyzing Microarray Gene Expression Data. Wiley-Interscience. John Wiley & Sons - Bowtell, D., Sambrook, J. (2003). DNA Microarrays. Cold Spring Harbor Laboratory Press. - Allison, David B., et al (2006). DNA microarrays and related genomics techniques design, analysis, and interpretation of experiments. Chapman & Hall/CRC - E. Rinaldis, A. Lahm. (2007). DNA microarrays: current applications. Wymondham: Horizon Bioscience - Mushegian, Arcady R. (2007). Foundations of comparative genomics. Academic Press - Hunt. S. P., Livesey, R. (2001). Functional genomics. A practical approach. Oxford University Press - Brown, Terry A. (2008). Genomas. Médica Panamericana - Sussman, Hillary E. y Smit, María (2006). Genomes. Cold Spring Harbor Laboratory Press - Meyers, Robert A. (2007). Genomics and genetics : from molecular details to analysis and techniques. Wiley-VCH - Gregory, T. Ryan (2005). The evolution of the genome. Elsevier Academic Press - Lynch, Michael (2007). The origins of genome architecture. Sinauer Associates
Complementary	- Straalen, Nico M. van (2006). An introduction to ecological genomics. Oxford University Press - Zhanjiang, Liu (2007). Aquaculture genome techonologies. Blackwell - Futuyama, Douglas J. (2006). Evolution. Sinauer Associates - Dale Jeremy (2008). From genes to genomes: concepst and applications of DNA technology. John Wiley & Sons - Sensen, Christoph W. (2005). Handbook of genome research genomics, proteomics, metabolism, bioinformatics, ethical & legal issues . Wiley-VCH

Recommendations
Subjects that it is recommended to have taken before
Traballo de Máster/610441022
Subjects that are recommended to be taken simultaneously
Proteómica/610441013 Cromosomas: Estructura. Función e Evolución/610441015 Xenética Humana/610441016 Toxicología Xenética/610441017

Subjects that continue the syllabus
Técnicas Celulares/610441001
Técnicas Moleculares/610441002
Mecanismos de xeración da variación xenética/610441005
Regulación da expresión xénica/610441006
Bioinformática e Modelado de Biomoléculas/610441020
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.