UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2017/18
Subject (*)	Genomics		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			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Vila Taboada, Marta	E-mail	marta.vila.taboada@udc.es	
Lecturers	Vila Taboada, Marta	E-mail	marta.vila.taboada@udc.es	
Web				
General description	Genomics applies recombinant DNA, Sanger DNA sequencing and Next Generation Sequencing methodology, and bioinformatics to sequence, assemble, and analyze genomes. Diciplines in genomics emcompass several areas of study, including structural and functional genomics, comparative genomics, and metagenomics, and have led to an "omics" revolution in modern biology.			

Study programme competences / results	
Code	Study programme competences / results
A3	Skills of understanding the functioning of cells through the structural organization, biochemistry, gene expression and genetic variability.
A11	Skills of understanding the structure, dynamics and evolution of genomes and to apply tools necessary to his study.
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
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			
Learning outcomes	Study programme competences / results		
To learn the basics of the different molecular techniques used in genomics, with particular emphasis in NGS	AR3 AR11		CC3
To acquire an updated view about the current scope and future perspectives of structural, functional and evolutionary genomics	AR3 AR11	BR1 BR5 BR9	CC2 CC8
To understand how genomes evolve and how molecular and bioinformatic tools are used for that purpose	AR3 AR11	BR1 BR5 BR9	CC2 CC8
DNA microarrays: experimental set up and data analysis.	AR3 AR11		

Contents	
Topic	Sub-topic

The Human Genome Project	History and results
Next Generation Sequencing (NGS)	Platforms Introduction to data analysis
Structural Genomics	Annotation Clinical diagnosis NGS applications
Functional Genomics	Epigenomics Transcriptomics Microarrays & NGS applications
Comparative Genomics	
Computer lab	1. Using GENOMESPACE for genomic analysis 2. Gene expression analysis and microarrays

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
ICT practicals	A3 A11 B1	7	14	21
Oral presentation	B5 B9 C2 C3 C8	1.55	6.2	7.75
Guest lecture / keynote speech	A3 A11 B1 C8	14	28	42
Objective test	A3 A11 B1 C8	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
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).
Oral presentation	Students may hold a 10-minute speech about a genomic issue previously agreed with the instructors.
Guest lecture / keynote speech	The instructors explain the main contents of each topic interacting as much as possible with the students.
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	Competencies / Results	Description	Qualification
Oral presentation	B5 B9 C2 C3 C8	Optional activity: each student may hold a 10-minute speech presenting a scientific paper (instructor's approval required). Assessment will also include the quality of the student's answers to any question from the audience after his/her talk.	15
Objective test	A3 A11 B1 C8	In order to pass the subject, all students will have to score at least 28 (out of 70) points in a multiple choice test and/or short-answer questionnaire.	70

ICT practicals	A3 A11 B1	Attendance to computer labs is mandatory for non-distance learners. In order to pass the subject, all students will have to score at least 8 (out of 15) points in a hands-on exam: a set of bioinformatic exercises to be solved using the software introduced during the computer labs.	15

Assessment comments
Students scoring at least 50 (out of 100) points but not reaching the aforementioned thresholds (ICT practicals and Objective test) will be awarded a 4.5 (out of 10) score. In the second opportunity they can choose to take both exams or only the failed one. Mark "A with distinction" will only be awarded to outstanding students passing the subject in June. Students will be scored as "ABSENT" (Non presentado) only when not involved in any of the assessed activities. In the case of exceptional circumstances, lecturers may assist the student to improve his/her learning process and/or catch up on missed work/assessments. The student is responsible for liaising with his/her lecturer to organise this assistance by e.g. applying for: an extended deadline to present his/her work or taking an exam in a different date. The coordinator can request evidence about the reason for such an application.

Sources of information	
Basic	- Allison, David B., et al (2006). DNA microarrays and related genomics techniques design, analysis, and interpretation of experiments. Chapman & Hall/CRC - Lesk, Arthur M. (2012). Introduction to Genomics. Oxford University Press - Bowtell, D., Sambrook, J. (2003). DNA Microarrays. Cold Spring Harbor Laboratory Press. - E. Rinaldis, A. Lahm. (2007). DNA microarrays: current applications. Wymondham: Horizon Bioscience - Campbell, A.M & Heyer, L.J. (2007). Discovering Genomics, Proteomics & Bioinformatics. Pearson Benjamin Cummings - McLachlan, G. J., Do, K-A., Ambroise, C (2004). Analyzing Microarray Gene Expression Data. Wiley-Interscience. John Wiley & Sons
Complementary	- Sensen, Christoph W. (2005). Handbook of genome research genomics, proteomics, metabolism, bioinformatics, ethical & legal issues . Wiley-VCH - Futuyama, Douglas J. (2006). Evolution. Sinauer Associates - Straalen, Nico M. van (2006). An introduction to ecological genomics. Oxford University Press - Zhanjiang, Liu (2007). Aquaculture genome techonologies. Blackwell - Dale Jeremy (2008). From genes to genomes: concepst and applications of DNA technology. John Wiley & Sons RECURSOS EN INTERNET: Biological database compilation at NAR: http://nar.oupjournals.org/content/vol29/issue1DOE Joint Genome Institut. Why sequence them? http://www.jgi.doe.gov/sequencing/why/index.htmlEMBL (European Molecular BIology Laboratory), Bioinformatics. http://www-db.embl.de/jss/servlet/de.embl.bk.emblGroups.EmblGroupsOrg/serv_0?t=0ExPASy (Expert Protein Analysis System). http://us.expasy.org/GeneMark: http://opal.biology.gatech.edu/GeneMark/GenomeNet (Kyoto University Bioinformatics Center).http://www.genome.jp/Genoscope. Le séquençage des génomes. http://www.genoscope.cns.fr/externe/Francais/Sequencage/GOLD (Genomes Online Database). http://www.genomesonline.org/Human genome: advanced annotation tutorial.http://www.mad-cow.org/00/annotation_tutorial.htmlHuman Genome Project Information.http://www.ornl.gov/sci/techresources/Human_Genome/home.shtmlIañez Pareja, E. (1997). Introducción a los Proyectos Genoma. http://www.ugr.es/~eianez/Biotecnologia/genoma-2.htmlKEGG (Kyoto Encyclopedia of Genes and Genomes). http://www.genome.jp/kegg/kegg2.htmlNacional Human Genome Research Institute: http://www.genome.gov/NCBI (National Center for Biotechnology Information). http://www.ncbi.nlm.nih.gov/The Sanger Institute.http://www.sanger.ac.uk/TIGR (The Institute for Genomic Research). http://www.tigr.org/tRNAscan-SE 1.21. http://www.genetics.wustl.edu/eddy/tRNAscan-SE/The WWW Virtual Library: Model Organisms: http://www.ceolas.org/VL/mo/

Recommendations

Subjects that it is recommended to have taken before
Cellular Techniques/610441001
Molecular Techniques/610441002
Genetic Variation Mechanisms/610441005
Regulation of gene expression/610441006
Bioinformatics and Biomolecular models /610441020
Subjects that are recommended to be taken simultaneously
Proteomics/610441013
Chromosomes. structure. function and evolution /610441015
Human Genetics/610441016
Genetic Toxicology /610441017
Subjects that continue the syllabus
Project/610441022
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.