UNIVERSIDADE DA CORUÑA

Teaching Guide			
Identifying Data			**2020/21**
Subject (*)	Genetics and molecular evolution	**Code**	614522005
Study programme	Mestrado Universitario en Bioinformática para Ciencias da Saúde		

Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Official Master's Degree	Yearly	First	Optional	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Martinez Lage, Andres	**E-mail**	andres.martinez@udc.es	
Lecturers	Gonzalez Tizon, Ana Maria	**E-mail**	ana.gonzalez.tizon@udc.es	
	Martinez Lage, Andres		andres.martinez@udc.es	
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Web				
General description	Introduction to Mendelian, Molecular and Evolutionary Genetics.			
Contingency plan	In case of another lockdown becaus of covid19: 1. Contents will be the same. 2. In-person instruction will change to virtual-only. This means that all lectures (theory and computer labs) will be hosted using MS TEAMS. 3. Tutoring sessions and any other communication will take place by means of email, videocalls or chat as implemented in MS TEAMS. 4. The only change in the assessment will be that all students will be evaluated online. 5. The recommended reference list will remain the same. If needed, instructors will provide with any reading and/or course resources to the students.			

Study programme competences / results	
Code	**Study programme competences / results**
A8	CE8 - Understanding the basis of the information of the hereditary material, its transmission, analysis and evolution
A9	CE9 ? To understand the benefits and the problems associated with the sequencing and the use of biological sequences, as well as knowing the structures and techniques for their processing
B1	CB6 - Own and understand knowledge that can provide a base or opportunity to be original in the development and/or application of ideas, often in a context of research
B2	CB7 - Students should know how to apply the acquired knowledge and ability to problem solving in new environments or little known within broad (or multidisciplinary) contexts related to their field of study
B5	CB10 - Students should possess learning skills that allow them to continue studying in a way that will largely be self-directed or autonomous.
B6	CG1 -Search for and select the useful information needed to solve complex problems, driving fluently bibliographical sources for the field
B7	CG2 - Maintain and extend well-founded theoretical approaches to enable the introduction and exploitation of new and advanced technologies
B8	CG3 - Be able to work in a team, especially of interdisciplinary nature
C1	CT1 - Express oneself correctly, both orally writing, in the official languages of the autonomous community
C2	CT2 - Dominate the expression and understanding of oral and written form of a foreign language

C3	CT3 - Use the basic tools of the information technology and communications (ICT) necessary for the exercise of their profession and lifelong learning
C7	CT7 ? To maintain and establish strategies for scientific updating as a criterion for professional improvement.
C8	CT8 - Rating the importance that has the research, innovation and technological development in the socio-economic and cultural progress of society

Learning outcomes				
Learning outcomes		Study programme competences / results		
Análise xenética mendeliana estudando o xene como unidade da herdanza	AJ8	BJ1 BJ2 BJ5 BJ6 BJ7 BJ8	CJ1 CJ2 CJ3 CJ7 CJ8	
Estudar a base cromosómica da herdanza, a determinación do sexo, herdanza extranuclear e o ligamento e recombinación xénica.	AJ8 AJ9	BJ1 BJ2 BJ5 BJ6 BJ7 BJ8	CJ1 CJ2 CJ3 CJ7 CJ8	
Estudar os cambios no material xenético	AJ8 AJ9	BJ1 BJ2 BJ5 BJ6 BJ7 BJ8	CJ1 CJ2 CJ3 CJ7 CJ8	
Estudo da xenética das poboacións.	AJ8 AJ9	BJ1 BJ2 BJ5 BJ6 BJ7 BJ8	CJ1 CJ2 CJ3 CJ7 CJ8	

Contents	
Topic	Sub-topic
Tema 1. ANALISE XENÉTICA MENDELIANA.	Os experimentos de Mendel: cruzamentos de monohíbridos e dihíbridos. Concepto de xenotipo e fenotipo. Terminoloxía e simboloxía. Análise de pedigrís.
Tema 2. BASE CROMOSÓMICA DA HERDANZA E DETERMINACIÓN DO SEXO.	Significado xenético da mitosis e a meiosis. Teoría cromosómica da herdanza. Determinación do sexo. Herdanza ligada ao sexo.
Tema 3. EXTENSIONES DA ANALISE XENÉTICA MENDELIANA.	Modificacións da dominancia. Alelismo múltiple. Letalidade. Penetrancia e expresividade. Pleiotropía. Epistase e interacción xénica.
Tema 4. HERDANZA EXTRANUCLEAR.	Efecto materno. Herdanza materna. Heteroplasmia.
Tema 5. LIGAMENTO E RECOMBINACIÓN EN EUCARIOTAS.	Ligamento e recombinación dos xenes nos cromosomas. Mapas de ligamento. Interferencia e coeficiente de coincidencia. Función de mapa: relación entre a distancia de mapa real e a frecuencia de recombinación.

Tema 6. LIGAMENTO E RECOMBINACIÓN EN BACTERIAS E VIRUS.	Transformación bacteriana. Conxugación: plásmidos e episomas sexuais. Transducción xeralizada e especializada.
Tema 7. ORGANIZACIÓN DO MATERIAL XENÉTICO NOS CROMOSOMAS.	Compoñentes do cromosoma eucariota. Paradoxa do valor C. Centrómeros e telómeros. O cariotipo. Secuencias únicas e secuencias repetidas. Familias xénicas. Mapas físicos e xenéticos.
Tema 8. A MUTACIÓN.	Mutación aleatoria e adaptativa. Tipos de mutacions. Mutación espontánea e inducida.
Tema 9. A MUTACIÓN CROMOSÓMICA (I): CAMBIOS NA ESTRUTURA DOS CROMOSOMAS.	Delecións. Duplicacións. Inversións. Translocacións. Fusións e disociacións robertsonianas.
Tema 10. A MUTACIÓN CROMOSÓMICA (II): CAMBIOS NO NÚMERO DOS CROMOSOMAS.	Euploidías e aneuploidías. Monoploidías. Poliploidías: autopoliploidía e alopoliploidía. Aneuploidías: non disxunción meiótica, monosomías, trisomías.
Tema 11. LA RECOMBINACIÓN GENÉTICA	Papel da recombinación xenética. Conversión xénica. Recombinación dos xenes de inmunoglobulinas.
Tema 12. ELEMENTOS XENÉTICOS TRANSPOÑIBLES	Elementos xenéticos transpoñibles. Significado evolutivo.
Tema 13. XENÉTICA DO DESENVOLVEMENTO	Xenes de efecto materno, xenes de segmentación e xenes homeóticos.
Tema 14. ENFERMEDADES XENÉTICAS HUMANAS	Enfermedades monoxénicas e multifactoriais. Xenes e cancro.
Tema 15. XENÉTICA DE POBOACIÓNS	Frecuencias alélicas e xenotípicas. Equilibrio de Hardy Weinberg. Efectos do apareamiento non aleatorio, mutación, selección, migración e azar.
Tema 16. EVOLUCIÓN MOLECULAR	Reconstrucción filoxenética. Árbores de xenes e de especies. Taxas de evolución do ADN e das proteínas. Orixe de novos xenes: ortólogos e parálogos.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
ICT practicals	A8 A9 B1 B5 B6 B7 B8 C2 C3 C7 C8	21	31.5	52.5
Student portfolio	A8 A9 B2 B5 B6 B8 C1 C2 C3 C7 C8	0	16.5	16.5
Objective test	A8 A9 B1 B2 B5 B6 B7 B8 C1 C2 C3 C7 C8	4	0	4
Guest lecture / keynote speech	A8 A9 B1 B5 B6 C1 C2 C7 C8	21	52.5	73.5
Personalized attention		3.5	0	3.5

(*)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	Computer labs aiming at learning how to solve particular questions with open-source software.
Student portfolio	Students will have to hand in in due time their solution to a couple of sets of problems/exercises.
Objective test	The exam will cover both questions of theory and calculation/reasoning exercises.
Guest lecture / keynote speech	Instructors will explain each topic and provide the instructions for any associated activiey (sets of exercises and/or computer labs).

Personalized attention	
Methodologies	Description

Guest lecture / keynote speech ICT practicals Student portfolio	Instructors will typically be available via email/MS TEAMS. Students can arrange for in-person tutoring sessions.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
ICT practicals	A8 A9 B1 B5 B6 B7 B8 C2 C3 C7 C8	All students will have to submit a reports following the instructor's guidelines. In these reports, students will answer questions and/or solve exercises using their own computer and the software introduced during the computer labs.	20
Student portfolio	A8 A9 B2 B5 B6 B8 C1 C2 C3 C7 C8	Valorarase o grao de comprensión do tema tratado, a capacidade de análise e síntese, a bibliografía consultada e a claridade da exposición ou redacción. No caso de boletíns de cuestións e problemas valorarase a capacidade de razoamento e de achegar solucións. Non será indispensable aprobar os traballos tutelados para aprobar o conxunto da materia.	20
Objective test	A8 A9 B1 B2 B5 B6 B7 B8 C1 C2 C3 C7 C8	In order to pass the subject, all students will have to take an exam that will include theory questions and calculation/reasoning exercises.	60

Assessment comments
Students scoring at least 50 (out of 100) points but not reaching the aforementioned thresholds (ICT practicals: 10 out of 20 points; Objective test; 21 out of 60 points) will be awarded a 4.5 (out of 10) score. When resitting, they can choose to take both exams or only the failed one. Students will be scored as "ABSENT" (Non presentado) only when not involved in any of the assessed activities.

Sources of information	
Basic	Griffiths AJF (2008) Genética. 9ª edición. McGraw-Hill Interamericana.Klug WS (2013) Conceptos de Genética. 10ª edición. Pearson.Pierce BA (2015) Genética: un enfoque conceptual. 5ª edición. Editorial Médica Panamericana.Russell PJ (2010) iGenetics. A Molecular Approach. 3rd edition. Pearson International Edition.
Complementary	

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
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(*)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.