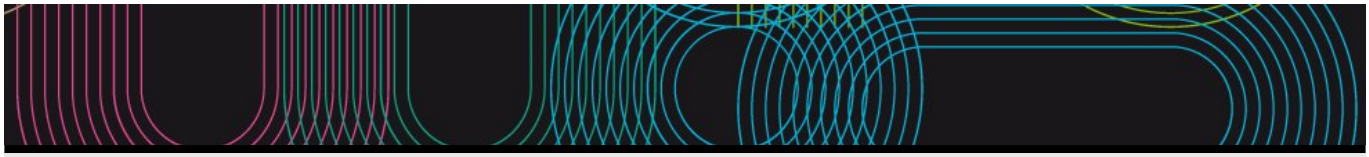

IDENTIFYING DATA				
Genetics II				
Subject	Genetics II			
Code	V02G030V01505			
Study programme	(*)Grao en Bioloxía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	Spanish English			
Department				
Coordinator	Pérez Diz, Ángel Eduardo Caballero Rúa, Armando			
Lecturers	Arenas Busto, Miguel Caballero Rúa, Armando Carvajal Rodríguez, Antonio Fernández Silva, Íria Pérez Diz, Ángel Eduardo Pouso Dios, Ramón Quesada Rodríguez, Humberto Carlos Sánchez Mendoza, Manuel José Tomás López, Laura Vicens Sánchez, Alberto			
E-mail	angel.p.diz@uvigo.es armando@uvigo.es			
Web				
General description	The subject Genetics II is an extension of the specific contents of Genetics taught in Genetics I. The topics covered in this subject include the structure of genomes, mutation and repair of genetic material, recombinant DNA technology, population genetics, evolution and the inheritance of quantitative traits. The lectures will be complemented with practical sessions in which the students will be able to exercise the knowledge acquired in the theoretical classes. As a complement to face-to-face training, this course has an online learning platform that implements the new technologies of learning and knowledge with the functioning of the subject, facilitating the personalized work and the integration of different sources of information.			

Competencies	
Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secundary Education and with a level that, even though it is suppported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A2	Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
A3	Students should prove ability for information-gathering and interpret important data (usually within their study field) to judge relevant social, scientific or ethical topics.
A4	Students should able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
B2	Ability of reading and analizing scientific papers and having critical assessment skills to understand data collection, deducing the main idea from the least relevant ones and basing on the correponding conclusions.
B3	Acquisition of general knowledge about the basic subjects of biology, both at theory and experimental level, without dismissing a higher specialization in subjects that are oriented to a concrete professional area.
B4	Ability in handling experimental tools, both scientific and computer technology equipment that support the search for solutions to problems related to the basic knowledge of biology and with those of a concrete labour context.
B5	Understanding of the levels of organization of living beings from a structural (molecular, cellular and organic) and functional point of view by observing their relations with the environment and other organisms, as well as their appearances in situations of environmental alteration.
B7	Collection of information about issues of biologic interest, analysis and emission of critical opinions and reason them including the reflection about social and/or ethical aspects related to the issue.

B10	Development of analytic and abstraction skills, the intuition and the logical and rigorous thought through the study of biology and its uses.
B11	Ability to communicate in detail and clearly: knowledge, methodology, ideas, issues and solutions to all audiences (not only qualified but unskilled in Biology).
B12	Ability to identify their own educational necessities in the biology field and in concrete labour areas and to organize their learning with a high grade of autonomy in any context.
C2	Recognizing different levels of Living systems organization. Performing phylogenetic analysis and identifying evidence of evolution.
C3	Identifying, analysing and characterizing biological samples, including those of human origin, and possible anomalies.
C4	Isolating, analysing and identifying biomolecules, viruses, cells, tissues and organs.
C7	Manipulating and analysing genetic data and carrying out genetic counseling
C10	Analysing and assessing the adaptation of living beings to the environment.
C11	Sampling, characterizing, managing, preserving and restoring Populations, Communities and Ecosystems.
C16	Growing, producing, transforming, improving biological resources as well as getting profits.
C20	Designing, using and supervising biotechnological processes.
C21	Processing and interpreting bioessays and biological diagnoses.
C24	Designing biological process models.
C25	Gathering background information, develop experimental work and analysing data results
C31	Knowing and handling technical and scientific apparatus.
C32	Knowing and handling basic or specific key concepts and terminology
C33	Understanding the social projection of Biology.
D1	Development of capacity of analysis and synthesis
D2	Acquisition of the organization and planning capacity for tasks and time
D3	Development of oral and writting communication abilities
D4	Acquisition of foreign language knowledge related to the study field
D5	Use of computer resources related to the study field
D6	Research and interpreting of information from different sources
D7	Resolution of issues and decision making in an effective way
D8	Development of the ability of independent learning
D9	Ability to work in collaboration or creating groups with an interdisciplinary character
D10	Development of the critical thinking
D11	Adquisition of an ethical agreement with the society and the profession
D12	Respectful behaviour to diversity and multiculturalism
D13	Sensitivity for environmental issues
D14	Adquisition of abilities in the interpersonal relationships
D15	Development of creativity, initiative and enterpreneurial spirit
D16	Acceptance of a quaility commitment
D17	Development of the self-criticism ability
D18	Development of negotiating power

Learning outcomes

Expected results from this subject	Training and Learning Results			
To know and understand the evolutionary mechanisms and models	A1	B2	C2	D1
	A2	B3	C3	D2
	A3	B4	C4	D3
	A4	B5	C7	D4
		B7	C10	D5
		B10	C11	D6
		B11	C16	D7
		B12	C20	D8
			C21	D9
			C24	D10
			C25	D11
			C31	D12
			C32	D13
			C33	D14
				D15
				D16
				D17
				D18

To know and understand the genetic basis of systematics and phylogeny	A1 A2 A3 A4	B2 B3 B4 B5 B7 B10 B11 B12	C2 C3 C4 C7 C10 C11 C16 C20 C21 C24 C25 C31 C32 C33	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18
To know and understand the genetic diversity	A1 A2 A3 A4	B2 B3 B4 B5 B7 B10 B11 B12	C2 C3 C4 C7 C10 C11 C16 C20 C21 C24 C25 C31 C32 C33	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18
To know and understand the genetic basis of adaptation to the environment	A1 A2 A3 A4	B2 B3 B4 B5 B7 B10 B11 B12	C2 C3 C4 C7 C10 C11 C16 C20 C21 C24 C25 C31 C32 C33	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18

To know and understand the genetic structure and population dynamics	A1	B2	C2	D1
	A2	B3	C3	D2
	A3	B4	C4	D3
	A4	B5	C7	D4
		B7	C10	D5
		B10	C11	D6
		B11	C16	D7
		B12	C20	D8
			C21	D9
			C24	D10
			C25	D11
			C31	D12
			C32	D13
			C33	D14
				D15
				D16
				D17
				D18

Contents	
Topic	
Mutation and recombination	Molecular basis of mutation and repair Chromosomal mutations Recombination Transposable elements
Genetic engineering	Cloning Molecular markers Applications of recombinant DNA
Genomics	Genome organization and structure Genome evolution Functional genomics
Population genetics	Hardy-Weinberg equilibrium Linkage disequilibrium Genetic drift and inbreeding Mutation and migration
Evolutionary genetics	Natural selection Molecular evolution Speciation
Quantitative genetics	Quantitative trait analysis Artificial selection

Planning			
	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	25	40	65
Problem solving	8	24	32
Computer practices	15	6	21
Autonomous practices through ICT	0	31	31
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Introductory activities	The objective is to define and focus the Genetics II subject describing the working method to be followed
Lecturing	The master sessions of the program are organized in 50-minute classes. In most cases they will be devoted to explain and develop basic concepts and methodologies, but due to the time constraints students must work autonomously
Problem solving	Classes of problems and exercises have as a basic mission to integrate and apply knowledge acquired in the theoretical classes. In an experimental science such as genetics learning using a problem-based approach is an essential didactic resource
Computer practices	The aim of the practices in the computer classroom is to obtain an overview of the different contents of the subject. There will be 5 practical sessions of 3 hours each, in which activities will be carried out with the following contents: Mutation: Luria-Delbrück fluctuation experiment. Sequence search by similarity and annotation. Searches in Genome Databases. Genetic drift. Estimates of diversity in a population. Selection and differentiation.

Autonomous practices through ICT	One of the competences that the student should achieve throughout their training is the ability to work autonomously. It is necessary to provide non-presential activities to guide them in this learning. The teledocencia platform TEMA will be used.

Personalized assistance

Methodologies	Description
Autonomous practices through ICT	The student's learning process that complements the lectures and practices will take place through the development of autonomous activities through the platform TEMA. In this platform the student will find the material with the presentations of the classes of theory, complementary reading, useful documents for studying and completing theoretical classes, practice lists, lists of problems and exercises to be performed within a given period, and self-evaluation. The lecturers will reserve a time to attend and solve the students' doubts, both for the master classes, as for the seminars and practical classes. In these activities the lecturer will guide the learning process of the students and help them to successfully carry out the corresponding autonomous work. Lecturers will indicate the first days of class the place, day and hours for that personalized attention.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	- Two tests during the course - Final examination - Assistance to the face-to-face activities	45	A1 A2 A3	B2 B3 B5 B7 B10	C2 C3 C4 C10 C11 C16 C20 C21 C24 C25 C32 C33	D1 D3 D4 D6 D10 D11 D12 D13 D15 D16 D17 D18
Problem solving	- Two tests during the course - Final examination - Assistance to the face-to-face activities - Resolution of problems	30	A1 A2 A3 A4	B3 B4 B11 B12	C2 C3 C10 C11 C16 C20 C21 C24 C25 C32 C33	D1 D2 D6 D7 D8 D9 D10 D14 D16 D17
Computer practices	- Assistance and performance - Written examination	15	A1 A2 A3	B4 B12	C7 C10 C24 C25 C31 C32 C33	D1 D5 D6 D7 D8 D9 D10 D17
Autonomous practices through ICT	- Online and other evaluations - Presentation of exercises within the established deadline	10	A1 A2 A3	B2 B3 B4 B7 B10 B12	C2 C10 C24 C32 C33	D1 D2 D3 D4 D5 D6 D7 D10 D11 D17

Other comments on the Evaluation

The subject will be evaluated in the following way:

- Final examination, that will imply 55% of the final qualification. To pass the subject it will be necessary to obtain a minimum of 5 points (out of 10) in that final examination. If this minimum is not obtained, the final qualification of the subject will be that obtained with the whole of qualifications, if that is lower than 5, or 4.5 if higher than 5. The examination

will consist of questions about theory and problems. Final exam date can be checked in the following link: http://bioloxia.uvigo.es/en/teaching/exams.

- Two tests carried out during the course (8th November and 13th December 2019), that will imply 20% of the final qualification and will consist of questions of theory and problems.

- Assistance and performance during the realisation of the practices in the classroom of computers. Written examination on the practices. This complete activity will be 15% of the final qualification.

- On-line and other type of activities and required exercises, that will imply 10% of the final qualification. At the end of each subject there will be a deadline to handle exercises via platform TEMA.

To pass the subject it will be necessary to obtain 5 points of 10 in the global qualification.

All qualifications, except that of the final exam, will be saved for the second opportunity in July, and indefinitely for later courses.

The students not attending the final examination will be marked as "No Presentado".

Any attempt to carry out illegal activities in the examinations (copy, etc.), as well as the plagiarism in the activities will imply a failure of the subject.

TEACHING SCHEDULE: http://bioloxia.uvigo.es/en/teaching/schedules

EXAMS SCHEDULE: http://bioloxia.uvigo.es/en/teaching/exams

Sources of information

Basic Bibliography

Benito, C., Espino, F. J., **Genética: Conceptos esenciales**, Médica Panamericana, 2013

W.S. Klug, M.R. Cummings, C.A. Spencer, M.A. Palladino, **Concepts of Genetics**, Pearson, 2014

A.J.F. Griffiths, S.R. Wessler, S.B. Carroll, J. Doebley, **Introduction to Genetic Analysis**, W. H. Freeman, 2010

Complementary Bibliography

Caballero, A., **Genética Cuantitativa**, Síntesis, 2017

Fontdevila, A., Moya, A., **Introducción a la Genética de Poblaciones**, Síntesis, 2017

D.S. Falconer, T.F.C. Mackay, **Introduction to Quantitative Genetics**, Pearson, 1996

Recommendations

Subjects that are recommended to be taken simultaneously

Advanced techniques in biology/V02G030V01504

Subjects that it is recommended to have taken before

Biology: Evolution/V02G030V01101
Statistics: Biostatistics/V02G030V01204
Biochemistry I/V02G030V01301
Biochemistry II/V02G030V01401
Genetics I/V02G030V01404