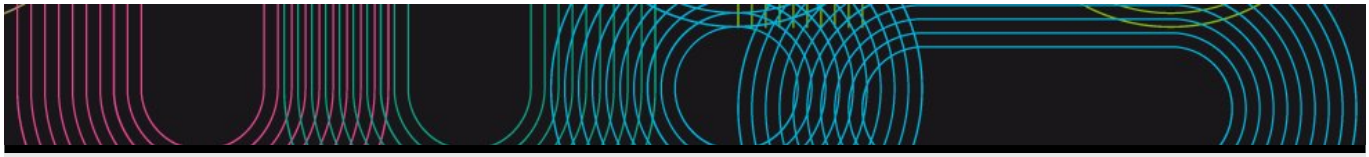
Universidade Vigo

Subject Guide 2024 / 2025



IDENTIFYING DATA				
Genetics II				
Subject	Genetics II			
Code	V02G031V01304			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	English			
Department				
Coordinator	Caballero Rúa, Armando Canchaya Sanchez, Carlos Alberto			
Lecturers	Arenas Busto, Miguel Caballero Rúa, Armando Canchaya Sanchez, Carlos Alberto Fernández Silva, Iria Galindo Dasilva, Juan Rolán Álvarez, Emilio			
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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 personalized work and the integration of different sources of information.			

Training and Learning Results	
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.
B1	Developing autonomous learning by identifying their own training need and organizing and planning tasks and time.
B3	Apply the knowledge acquired in the degree and use the scientific-technical instrumentation and CIT in contexts of Biology and/or related to the professional practice.
C1	Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools.
C2	Identify levels of organisation of living beings through the study of current specimens and fossils. Carry out phylogenetic analyses and study the mechanisms of heredity, evolution and biodiversity.
C5	Manipulate and analyse genetic material and determine its alterations and pathological implications. Knowing the applications of genetic engineering.
C7	Sampling, characterising, cataloguing and managing natural and biological resources (populations, communities and ecosystems).
D5	Communicate effectively and appropriately, including the use of computer tools and English.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

To understand the mechanisms of mutation and recombination and their implications. To know the methods and applications of genetic engineering.	A1 A2 A3	B1 B3	C1 C2	D5
To know the structures of genomes of genetic engineering.	A1 A2 A3	B1 B3	C5	D5
To know the structures of genomes and understand their functions.	A1 A2 A3	B1 B3	C2	D5
Be able to analyze the genetic structure of populations and understand the evolutionary forces acting on them.	A1 A2 A3	B1 B3	C1 C2 C7	D5
Understanding the genetic basis of quantitative traits and the applications of genetics in animal and plant breeding.	A1 A2 A3	B1 B3	C1 C2 C7	D5

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	23	40	63
Problem solving	8	24	32
Practices through ICT	15	6	21
Autonomous problem solving	0	31	31
Essay questions exam	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

	Description
Introductory activities	The objective is to define and focus on 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 dedicated to explaining and developing basic concepts and methodologies, but due to time constraints, students must work autonomously
Problem solving	Classes of problems and exercises primarily aim to integrate and apply the knowledge acquired in the theoretical classes. In an experimental science such as Genetics, learning using a problem-based approach is an essential didactic resource
Practices through ICT	The computer classroom practices aim to provide an overview of the subject's different contents. There will be five practical sessions of three hours each, in which activities will be carried out on 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 problem solving	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 distance learning platform MooVi will be used.

Personalized assistance

Methodologies	Description
Autonomous problem solving	The student's learning process, which complements the lectures and practices, will take place by developing autonomous activities through the MooVi platform. 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 time to attend and solve the students' doubts, both for the master classes, the seminars, and practical classes. In these activities, the lecturer will guide the students' learning process and help them carry out the corresponding autonomous work successfully. Lecturers will indicate the procedure to carry out that personalized attention on the first days of class.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	- Two tests during the course - Final examination - Assistance to the face-to-face activities	40	A1 A2 A3	B1	C2 C5 C7	D5
Problem solving	- Two tests during the course - Final examination - Assistance to the face-to-face activities - Resolution of problems	35	A1 A2 A3	B3	C1	D5
Practices through ICT	- Assistance and performance - Written examination	15	A1 A2 A3	B3	C1 C2 C5 C7	D5
Autonomous problem solving	- Online and other evaluations - Presentation of exercises within the established deadline	10	A1 A2 A3	B1 B3	C1	D5

Other comments on the Evaluation

Knowledge of the subject will be assessed as follows:

GLOBAL EVALUATION

The request for this evaluation option must be submitted at the time and in the way determined by the Center, which will be published prior to the academic start.

For this type of evaluation, there will be a final exam that will cover the entire subject, with theory questions and problems. In addition, to be eligible for this evaluation option, attendance at practicals and passing the exam at the end of each one of them will be mandatory.

CONTINUOUS EVALUATION

control-1: 17.5%

control-2: 17.5%

practices: 15%

activities: 10%

final exam: 40%

-Final exam, which will account for 40% 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 exam. If this minimum mark is not achieved, the final qualification for the subject will be that obtained with the overall grades, if it is less than 5, or 4.5 if it is greater than 5. The exam will consist of theory and problems. The final exam schedule can be consulted at the following link: http://bioloxia.uvigo.es/es/docencia/examenes

- Two tests carried out during the course, which will each account for 17.5% of the final qualification and will consist of theory questions and problems.

- Assistance and use during the practical classes in the computer room. Written exam on practices, which will be carried out at the end of each of them. This complete activity will account for 15% of the final qualification.

- Online activities and other activities and exercises that are requested, which will account for 10% of the final grade. At the end of each topic, a period will be given to carry out exercises via the MooVi platform.

To pass the subject it will be necessary to obtain 5 points out of 10 in the overall weighted evaluations. All grades, except for the final exam, will be saved for the second opportunity in July, and indefinitely for subsequent courses. Students who do not take the final exam will be recorded as Not Present. Any attempt to carry out illegal activities in the exams (copying, etc.), as well as plagiarism in the activities carried out will result in a failing in the matter.

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**, 1, Médica Panamericana, 2013

W.S. Klug, M.R. Cummings, C.A. Spencer, M.A. Palladino, D.A. Killian, **Concepts of Genetics**, 12, Pearson, 2020

A.J. F. Griffiths, J. Doebley, C. Peichel, D.A. Wassarman, **Introduction to Genetic Analysis**, 12, W. H. Freeman, 2020

B. A. Pierce, **Genetics. A Conceptual Approach**, 7, Macmillan International, 2020

L.E. Hartwell, M.L. Goldberg, J.A. Fischer, L. Hood, **Genetics. From Genes to Genomes**, 6, McGraw Hill, 2018

Complementary Bibliography

Recommendations

Subjects that it is recommended to have taken before

Biochemistry I/V02G031V01201
Biochemistry II/V02G031V01206
Genetics I/V02G031V01209