



## IDENTIFYING DATA

### Genetics I

Subject	Genetics I			
Code	V02G030V01404			
Study programme	(*)Grao en Bioloxía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish English			
Department				
Coordinator	Morán Martínez, María Paloma Canchaya Sanchez, Carlos Alberto			
Lecturers	Arenas Busto, Miguel Canchaya Sanchez, Carlos Alberto Carvajal Rodríguez, Antonio Estévez Gómez, Nuria Fernández Rodríguez, Jonathan López Bruzos, Alicia Morán Martínez, María Paloma Prieto Fernández, Tamara Rodríguez Martín, Bernardo Rolán Álvarez, Emilio Soto Vazquez, Jose Luis			
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### Web

General description	<p>The contents of the Course Genetic I include: Mendelian Genetics. Linkage And recombination. Structure and organisation of the DNA. Replication, mutation and repair. Gene expression and its regulation. Genetic engineering.</p> <p>After taking Genetics I, the students will have to know and comprehend:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The mechanisms of the inheritance.</li> <li><input type="checkbox"/> The structure and function of the nucleic acids.</li> <li><input type="checkbox"/> The expression, replication, transmission and modification of the genetic material.</li> <li><input type="checkbox"/> The genetic regulation and the genetic bases of development.</li> </ul>
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## Competencies

Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secondary Education and with a level that, even though it is supported 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 analyzing scientific papers and having critical assessment skills to understand data collection, deducing the main idea from the least relevant ones and basing on the corresponding 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.
- 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.
- 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 writing 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			
New	A3	B3 B5	C4 C7	D1 D6 D8 D10
New	A3	B3 B4 B5	C3 C4 C7 C10	D4 D6 D8 D10
New	A3	B4 B5	C3 C21 C24	D1 D4 D6 D8
New	A2 A3	B4 B5 B7	C3 C4 C7 C20 C21 C31	D1 D2 D13 D15
New	A1 A2 A3	B5 B7 B10	C10	D9 D13 D15 D17

New	A1 A2 A3 A4	B3 B4 B5	C7	D11 D12 D16 D18
New	A1 A2 A3	B3 B4 B5 B7	C4 C16 C20	D6 D7 D16
New	A2 A3	B2 B3 B10 B11	C25 C31 C32	D3 D5 D7
New	A1 A3 A4	B10 B11 B12	C33	D14 D16 D17 D18
New	A1 A2 A3	B3 B4	C31 C32	D1 D4 D6

## Contents

Topic	
Transmission of the hereditary material	Inheritance and chromosomes. Segregation and independent transmission. Gene interaction. Inheritance and environment. Resolution of problems on mendelian and mitochondrial inheritance.
Linkage and genetic maps	Genetic Linkage and recombination. Chromosomal cartography in eukaryotes. Resolution of problems of linkage and genetic maps.
Nature and replication of the hereditary material	Nature and structure of the hereditary material. The replication of the DNA. Organisation of the DNA in the chromosomes. Methods of study of the DNA. Resolution of problems on DNA and on inheritance of mutations of DNA.
Expression of the genetic information.	Gene transcription. Genetic code. Translation. Resolution of problems on translation and transcription and on inheritance of mutations that affect these processes.
Regulation of the gene expression	Regulation of the gene expression in prokaryotes. Regulation of the gene expression in eukaryotes. Resolution of problems of gene regulation in prokaryotes and eukaryotes and on inheritance of mutations that affect to these processes.
Program of Lab sessions	Management of <i>Drosophila</i> in the laboratory Blood groups and genealogical trees Recombination in <i>Sordaria</i> Restriction Genetic Maps Bacterial transformation

## Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	15	45	60
Troubleshooting and / or exercises	9	36	45
Seminars	3	0	3
Laboratory practises	20	6	26
Previous studies / activities	0	16	16
Troubleshooting and / or exercises	0	0	0
Short answer tests	0	0	0

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

Description

Master Session	They will follow the course schedule. They are organized in lessons, 50 minutes each. In most cases, it is dedicated to explain and develop the contents of the course (concepts and methodologies), but due to time constraints, students need to complete them (before and after lectures), by self-study using textbooks, complementary readings, computer animations, and reference web pages.
Troubleshooting and / or exercises	The purpose of working through problems is to better understand the concepts covered during theoretical lectures. A number of problems (available in TEMA) will be assigned throughout the semester. These will be collected periodically as they will be graded in the class time. This is a compulsory task. Students may be called upon to solve examples of the completed problems (on the board on their corresponding due dates).
Seminars	The seminars will take place in small groups and they will be dedicated to review basic concepts required to successfully complete the course
Laboratory practises	The aims of the laboratory sessions are to present to the student experimental procedures related to the course. Students are expected to read the corresponding lab material BEFOREHAND. The contents of the lab sessions are connected with the contents of the lectures both theoretical and problem-solving, so that their content is also part of the knowledge necessary to pass the course.
Previous studies / activities	Genetics is a difficult subject. There is a lot of material to learn it. Genetics is also a problem-based course. It will be necessary to memorize many concepts, organize information, draw conclusions, and solve problems. We recommend at least 2-3 hours of study for every hour of lecture. In order to verify that the learning outcomes are acquired according to the course schedule, you have to use the electronic platform TEMA. Here, students will find (in Spanish and English) lecture presentations, supplementary readings, learning material, laboratory guides, problems with complete answers and explanations, and online self-assessment tests.

### Personalized attention

Methodologies	Description
Previous studies / activities	Students can discuss with the lecturers about the course contents during tutoring hours and through other electronic means (e-mail and forums at TEMA platform).

### Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practises	Attendance and performance in the laboratory sessions. A multiple choice type questions will take place at the end of each laboratory session. Attendance to laboratory sessions is mandatory. For repeating students, grade obtained on the previous year will be kept. So that, only for them attendance will be voluntary	10	A1 A2 A3 A4	B10 B12	C21 C24 C32	D1 D2 D6 D14
Previous studies / activities	Work outside the classroom. In order to obtain grading, each student must have their own set of completed problems to turn in before due dates and each student should follow the learning sequence in TEMA (multiple-choice test resolution, download supplementary materials among other activities) for all the units.	10	A1 A2 A3 A4	B2 B3 B4 B5 B7 B10 B11 B12	C3 C4 C7 C10 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
Troubleshooting and / or exercises	50% of written exams will consist of problem solving	40	A1 A2 A3	B2 B3 B4 B5 B7 B10 B11 B12	C3 C4 C7 C10 C16 C20 C21 C24 C25 C31 C32 C33	D1 D3

Short answer tests	50% of written exams will consist of answering short questions about theoretical concepts	40	A1 B2 C7 D12 A2 B3 C10 D16 A3 B4 C24 D17 A4 B5 C25 B7 C32
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## Other comments on the Evaluation

### Evaluation

The calendar of the tests is in this link: [http://bioloxia.uvigo.es/docs/docencia/examenes/exames\\_grado\\_2017-18.pdf](http://bioloxia.uvigo.es/docs/docencia/examenes/exames_grado_2017-18.pdf)

#### 1. Evaluation in June

##### Option A

- One mid-term exam (non-cumulative) (20% of the final grade) . It involves lectures and problem- solving material.
- Cumulative final exam (60% of the final grade) . It will be necessary to obtain at least 4 points (out of 10) to pass the exam. It will consist of short questions and problem solving.
- Attendance and performance in the laboratory session. (10% of the final grade) . A multiple choice type questions will take place at the end of each laboratory session. Attendance to laboratory session is mandatory. For repeating students , grades obtained the previous year will be kept. So that, only for them, attendance will be voluntary.
- Work outside the classroom (10% of final grade) . In order to obtain grading, each student must have their own set of completed problems to turn in before due dates and each student should follow the learning sequence in TEMA (multiple-choice test resolution, download supplementary materials among other activities) for all the units.

##### Option B (for students who do not attended the mid-term exam)

- A single **final exam (90% of final grade)**. In this exam, it will be necessary to obtain at least 5 points to pass the subject.
- **Attendance and performance in the laboratory sessions. (10% of the final grade)**. A multiple choice type questions will take place at the end of each laboratory session. Attendance to laboratory sessions is mandatory. For repeating students, grade obtained on the previous year will be kept. So that, only for them attendance will be voluntary

#### 2. Evaluation in July (and Extraordinary)

##### Unique option

- Final exam (90% of final grade). In this exam, it will be necessary to obtain at least 5 points to pass the subject.
- Attendance and performance in the laboratory sessions. (10% of the final grade). A multiple choice type questions will take place at the end of each laboratory session. Attendance to laboratory sessions is mandatory. For repeating students, grade obtained on the previous year will be kept. So that, only for them attendance will be voluntary.

#### Students who are absent from the exam will not be graded

##### Academic Ethics:

- Cheating in this course will not be tolerated.
- Cheating includes but is not limited to: plagiarism, copying during the exams, falsifying documentation related to absences, use of unauthorized electronic devices during an exam
- Penalties for cheating can include failing course

## Sources of information

### Basic Bibliography

### Complementary Bibliography

Benito Jiménez, César, **141 problemas de genética : resueltos paso a paso**, 1, Síntesis, 2015

Benito Jiménez, César, **Genética: Conceptos esenciales**, 1, Médica Panamericana, 2012

Mensúa, Jose Luis, **Genética: problemas y ejercicios resueltos**, 1, Alhambra, 2003

Klug, Cummings & Spencer, **Klug, Cummings, Spencer**, 10, Pearson, 2013

Pierce, Benjamin A, **Genética : un enfoque conceptual**, 5, Médica Panamericana, 2015

Watson, Baker, Bell, Gann, Levine, Losick, **Biología molecular del gen**, 7, Médica Panamericana, 2016

Pierce, Benjamin A., **Genetics essentials : concepts and connections**, W.H. Freeman and Company, 2016

Hartwell, Leland H., **Genetics : from genes to genomes**, 5, McGraw-Hill Education, 2015

Hartl, Daniel L., **Genetics : analysis of genes and genomes**, 7, Jones and Bartlett, 2009

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## **Recommendations**

### **Subjects that continue the syllabus**

Genetics II/V02G030V01505

### **Subjects that are recommended to be taken simultaneously**

Biochemistry I/V02G030V01301

Biochemistry II/V02G030V01401

### **Subjects that it is recommended to have taken before**

Biology: Evolution/V02G030V01101

Biology: Basic laboratory techniques/V02G030V01203