# 1. BASIC INFORMATION

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|---|---|
| **Subject** | Genetics |
| **Degree** | Bachelor Degree in Biotechnology |
| **School/ Faculty** | Faculty of Biomedical Sciences and Heatlh |
| **Year** | First |
| **ECTS** | 6 ECTS |
| **Type** | Core |
| **Language** | English |
| **Modality** | On-site learning |
| **Semester** | S2 |
| **Academic year** | 2024-2025 |
| **Coordinating teacher** | Fernando de Miguel |
| **Teachers** | Alejandra Quiroga del Río, Fernando de Miguel |

# 2. INTRODUCTION

Genetics is a compulsory 6 ECTS subject taught in the second semester of the Year 1 of the Bachelor Degree of Biotechnology. This subject is part of Module II "Fundamentals of Biology", which comprises a total of 24 ECTS.

The program of this subject aims to provide the student with knowledge in the field of genetics that will be very useful in their formation as biotechnologists, by showing them the basic concepts for understanding the processes of inheritance and hereditary material. Several blocks are differentiated in this subject, which run through the field of genetics from the molecular point of view to the final organization in organisms. Likewise, students will be come in contact with different technological tools and the most relevant model organisms in the study of biotechnological processes.

# 3. LEARNING RESULTS

**Knowledge**

**CON02**. Recognizing the structure, organization and function of viral and cellular entities, tissues, organs and systems, as well as the processes that take place in them. Recognizing the principles by which cellular function is governed from a molecular perspective.

**Skills**

**HAB02**. Use of samples and laboratory techniques maintaining the necessary safety and quality measures in each laboratory.

• Acquire the necessary skills to work in a biology and genetics laboratory. Apply preventive measures in a biological laboratory aimed at reducing the risks associated with the manipulation of biological samples.

• Get an oral and written command of the specific language and vocabulary that demonstrates a correct understanding of the various types of living organisms and fundamental differences in their formation, organization and functions.

• Acquire the necessary knowledge to interpret cellular and subcellular images obtained by optical and/or electronic microscopy.

• Acquire the ability to apply the knowledge about the organization of genetic information in chromosomes and the concepts of variability, conservation of genetic information and the transmission of genetic information.

**Competences**

**COMP01**. Acquire an integrated vision of cell function as well as of its different compartments, both at the metabolic and gene expression level.

**COMP02**. Identify and describe the structure and function of different types of cells, both in unicellular and multicellular organisms.

**COMP06**. Develop the necessary skills to use the basic equipment, instruments and techniques of biotechnology research, following quality and biosafety standards.

## 4. CONTENTS

- Fundamentals of genetics.
- Molecular basis of genetic information.
- Mendelian and non-mendelian genetics.
- Variability and conservation of genetic information.
- Regulation of gene expression.
- Transmission of genetic information.
- Genetic diseases.
- Population genetics.
- Introduction to evolution.

## 5. TEACHING-LEARNING METHODOLOGIES

Te following teaching-learning techniques will be used:

- Lecture
- Case method
- Cooperative learning
- Project-based learning

- Workshop-/laboratory-based learning

## 6. TRAINING ACTIVITIES

The types of training activities that will be carried out and the hours of student's dedication to each of them are as follows:

**On-site learning:**

| Training activity | Hours |
|---|---|
| Lectures | 32 |
| Asynchronous lectures | 12 |
| Debates and discussions | 4 |
| Case analysis | 4 |
| Problem solving | 6 |
| Student's oral presentations | 2 |
| Preparation of reports and essays | 7 |
| Tutorials | 15 |
| Independent work | 50 |
| Activities in workshops and/or laboratories | 8 |
| Research (scientific/case) and projects | 4 |
| On-site objective knowledge tests | 6 |
| **TOTAL** | **150** |

## 7. ASSESSMENT

The evaluation systems are listed below, as well as their weight in the total grade for the subject:

**On-site learning:**

| Evaluation Systems | Weight |
|---|---|
| On-site objective knowledge tests | 60% |
| Student's oral presentations | 5% |
| Reports and essays | 15% |
| Cases/problems | 10% |
| Laboratory practical teaching | 10% |

On the Virtual Campus, when you access the subject, you will be able to consult in detail the assessment activities that must be carried out, as well as the delivery dates and the assessment procedures for each of them.

## 7.1. Ordinary exam period

To pass the subject in the ordinary exam period, students must obtain a grade of al least 5.0 out of 10.0 points in all parts of the evaluation of the subject. Those sections that are graded under 5.00 points (not passed) in the ordinary call must be re-assessed in the extraordinary session.

The final grade will be the **weighted average** of the partial grades of each of the approved training activities, according to the table above. In the event of not having passed any of the evaluable blocks, the final grade will always be that of the **block with the lowest score**.

The continuous assessment system for training activities requires **attendance of at least 50%** of classes.

*It is mandatory to justify at least 50% attendance at classes, as a necessary part of the assessment process and to comply with the student's right to receive advice, assistance and academic monitoring from the professor. For these purposes, students must use the technological system that the University makes available to them, to prove their daily attendance at each of their classes. This system will also serve to guarantee objective information on the student's active role in the classroom. Failure to prove by the means proposed by the university, of at least 50% attendance, will authorize the professor to grade the subject as failed in the ordinary call, in accordance with the grading system provided for in these regulations. All of this, without prejudice to other requirements or higher attendance percentages that each faculty may establish in the teaching guides or in its internal regulations. Regulations for the assessment of official degree qualifications, Art. 1 point 4.*

(http://www.uem.es/myfiles/pageposts/reglamento_evaluacion_titulaciones_oficiales_grado.pdf).

## 7.2. Extraordinary exam period (resits)

In order to pass the subject in the extraordinary session, those students who have **complied with the 50% attendance** in the ordinary session must obtain a grade of **at least to 5.0 out of 10.0 points** in all parts of the evaluation of the subject that they had not passed during the ordinary session.

In case of complying with the 50% attendance requirement, the activities failed in the ordinary session must be submitted, taking into account the corresponding corrections or indications by the teacher. Those activities not submitted on the ordinary call must be delivered at the extraordinary session.

The final grade will be the **weighted average** of the partial grades of each of the approved activities, according to the table above. For this calculation the grade of the evaluable activities passed in the ordinary session will be maintained in case of complying with the 50% attendance requirement.

Students who have **not met the 50% attendance requirement** in the regular session **must pass all objective tests in the extraordinary session, even if they had passed some in the ordinary call**. They must obtain a grade greater than or equal to 5.0 out of 10.0 in all of them to pass the subject.

## 8. TIMELINE

This section details the schedule, with delivery dates, for graded activities of the subject:

| Assesable activities | Date |
|---|---|
| Graded activities + Case/problem + Reports and essays | Depending on the progress of the syllabus |
| Laboratory practical teaching | Weeks 6, 9, 11 or 16 |
| Objective knowledge test – First partial exam | Week 9 – 10 |
| Objective knowledge test – Second/final partial exam | Week 17-18 |

This schedule may be subject to changes due logistical reasons. Any changes will be notified to the student in a timely manner.

## 9. BIBLIOGRAPHY

The reference textbook for the subject is:

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

More recommended bibliography:


- Strachan and Read, *Human Molecular Genetics*, 3rd ed, Garland Science, 2003.
- Passarge, *Color Atlas of Genetics*; 5th ed, revised and updated, Thieme Publishing Group, 2017.
- Pierce, *Genetics: A conceptual apporach*, 4th ed, W. H. Freeman & Co Ltd, 2012.
- Pierce, *Genetics Essentials: Concepts and Connections*, 3rd ed, W.H.Freeman & Co Ltd, 2015
- Brown, *Genomes 5*, 5th ed, CRC Press, 2023.
- Klug, *Concepts of genetics. Global edition*, 12th ed, Pearson, 2019.

- Lewis, *Human Genetics: Concepts and Applications*, 12th ed, Mc Graw Hill India, 2019.
- Lewin, Genes IX, Jones and Bartlett Publishers, 2007.
- Jorde, *Medical Genetics*, 6th ed, Elsevier, 2019.
- Nussbaum, *Thompson & Thompson Genetics in Medicine*, 8th ed, Elsevier, 2015.


Internet resources:

- Scientific papers
- http://www.genome.gov/Glossary/index.cfm
- http://www.ncbi.nlm.nih.gov/PubMed (U.S. National Library of Medicine)
- http://www.ensembl.org/index.html
- http://www.neb.com/nebecomm/tech_reference/restriction_enzymes/cloning_guide.asp (New England Biolabs company web page).
- http://www.scirus.com/srsapp/
- http://www.nature.com/scitable (Educational website by Nature group)
- http://www.dnalc.org/ (DNA Learning Center, Cold Spring Harbor Laboratory)
- http://ghr.nlm.nih.gov/glossary=contig

## 10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT (ACADEMIC SUCCESS CENTER)

At the Educational Guidance and Diversity Unit (ODI) we offer support to our students throughout their university life to help them achieve their academic goals. The pillars of our action are the inclusion of students with specific educational support needs, universal accessibility in the different university campuses and equal opportunities.

Services offered:

1. Support and follow-up through personalized advice and plans for students who need to improve their academic performance.

2. In terms of attention to diversity, non-significant curricular adjustments are made. These adjustments are made at methodology and evaluation level, in those students with specific educational needs, thereby pursuing equal opportunities for all students.

3. We offer students different extracurricular training resources to develop various skills that will enrich their personal and professional development.

4. Vocational guidance, by providing tools and advice to students with vocational doubts or who believe they have made a mistake in choosing a degree.

Students who need educational support can e-mail us at:

orientacioneducativa@universidadeuropea.es

## 11. SATISFACTION SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in our satisfaction surveys to detect strengths and areas for improvement regarding the teaching staff, the degree and the teaching-learning process.

The surveys will be available in the survey space of your virtual campus or via your e-mail.

Your feedback is necessary to improve the quality of the degree.

Thank you very much for your participation.