

Genetics

Code: 100984
ECTS Credits: 6

Degree	Type	Year	Semester
2500502 Microbiology	OB	1	2

Contact

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Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: Yes

Prerequisites

There are no prerequisites, but it is recommended to review the concepts of Genetics learned in high school. Likewise, it is convenient to have a good knowledge of the basic materials studied during the first semester of the Microbiology degree, as well as of the subjects taking simultaneously during the second semester.

Objectives and Contextualisation

The science of genetics studies the hereditary material of living beings; how it is transmitted to the offspring, how it is expressed and how it varies and evolves in the populations. Genetics is a fundamental science that integrates all levels of organism organization, from the molecular to the population and the evolutionary.

This Genetics class is mandatory, and it is the first introduce course for student to acquire the basic concepts of this science and to understand i) the laws of the inheritance, ii) its cytological and molecular base and iii) its variation to cellular and population level.

The main objectives of this subject are:

- To understand the bases and mechanisms of biological inheritance, by making and using genetic maps.
- To analyze the genetic variation within and between populations.
- To identify the structure of the genetic material and its types of organization.
- To encourage students to reason, infer and draw conclusions, by solving queries, basic genetic problems and / or by discussing scientific texts.

Skills

- Communicate orally and in writing.
- Design experiments and interpret the results
- Develop creativity and initiative.
- Develop critical reasoning skills in the field of study and in relation to the social context.
- Identify and solve problems.
- Know and interpret microbial diversity, the physiology and metabolism of microorganisms and the genetic bases that govern their vital functions.

- Obtain, select and manage information.
- Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
- Work individually or in groups, in multidisciplinary teams and in an international context.

Learning outcomes

1. Communicate orally and in writing.
2. Design experiments and interpret the results
3. Develop creativity and initiative.
4. Develop critical reasoning skills in the field of study and in relation to the social context.
5. Identify and solve problems.
6. Identify the structure of the genetic material and its organisational variability.
7. Interpret genetic variation in a population and between populations.
8. Obtain, select and manage information.
9. Produce and work with genetic and physical maps.
10. Solve basic problems in genetics.
11. Understand heredity mechanisms and the fundamentals of genetic improvement.
12. Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
13. Work individually or in groups, in multidisciplinary teams and in an international context.

Content

The content of this course is the following:

An introduction to Genetics. Organization of the genetic material. Replication and recombination mechanisms. Gene expression: transcription and translation processes. Gene regulation. Point mutation and chromosomal mutation. DNA Repair. Mendelian genetics and chromosomal theory of inheritance. Patterns of gene inheritance. Sex-linkage inheritance. Patterns of two genes inheritance. Relations of dominance. Linkage and genetic maps. Quantitative genetics. Populations Genetics and evolution.

Methodology

In this subject the following activities have been programmed:

Lectures:

The student acquires the scientific knowledge of the class by attending to lectures, and are complemented by personal work and study of the topics discussed. These lectures are conceived as a fundamentally unidirectional method of transmitting knowledge, from the teacher to the student, and it forces the student to develop autonomous learning strategies out of the classroom.

Problem sessions: Here the knowledge acquired in the theory classes and by personal study are applied to the resolution of practical cases (questions, interpretation of texts and / or basic problems of genetics), working the strategies to solve problems. The student will work individually or in small groups which allow him to acquire the ability of analysis and synthesis. In addition, the problem sessions will allow the application of statistical resources in the interpretation of genetic data. Weekly, some practical cases will be assigned as homework to resolve by the students individually or in groups.

Assignment of homework to perform in groups. In this activity the students will apply the knowledge acquired in theory and problem sessions, and the activity encourage bibliography searching and to do teamwork.

Tutorials: The student will have the opportunity to solve doubts related to the class by individual tutoring. This is an essential teaching complement that allows to provide individual attention to the students. The detailed information regarding the place and hours where this activity will take place will be duly provided by the teacher.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Problem sessions	12	0.48	4, 3, 2, 5, 10, 1, 13
Theory sessions	33	1.32	11, 9, 6, 7, 8
Type: Supervised			
Tutorials	3	0.12	4, 3, 5, 1
Type: Autonomous			
Reading texts	8	0.32	8, 12
Searching of bibliography	6	0.24	8, 12
Solving problems	30	1.2	2, 5, 10
Study	45	1.8	4, 8, 12
Writing assignments	7.5	0.3	4, 3, 8, 1, 13, 12

Evaluation

The competences of this subject will be evaluated through continuous evaluation. The result of the different written tests and the results obtained in the delivery of activities will be taken into account.

The evaluation of contents of the theory and problem sessions is done as follows:

Midterm exams. The students perform 2 midterm exams that are eliminatory. Each midterm exam consists of two well-differentiated parts: 1) test of multiple-choice questions (90% of the exam grade) and 2) answering questions (10% of the exam grade). It is necessary to obtain a grade ≥ 4 in each of the midterm exams, to pass the subject. The grade corresponding to this evaluation is the average of the individual grade obtained in the two test, and it is necessary to obtain a grade ≥ 5 in the midterm exams to pass the class.

The average grade obtained by this concept represents 90% of the final subject grade.

Evaluation of the assigned homework. The grade obtained in this part represents 10% of the final grade of the course.

It is necessary to obtain a grade ≥ 5 in the midterm exams of theory content to do the average grade with the grades obtained in the assigned homework. To pass the class it is necessary to obtain a grade ≥ 5 average of the midterm exams and the assigned homework.

Recovery exam and improve the grade. Students who failed any of the midterm tests, must take the recovery exam of the corresponding part. To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course.

Students that have passed the two midterm tests and wish to improve the grade, they can take the recovery exam, bearing in mind that only the grade of this last exam will be valid for the final grade.

The student will be graded as "No Avaluable" if the weighthin of all conducted evaluation activities is less than 67% of the final score".

Students that cannot attend to a midterm exam and can justify the cause, must to provide a justifying document and an alternative date for the test will be assigned.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Answering questions test	9% de la nota final	1	0.04	11, 4, 3, 2, 9, 5, 6, 7, 8, 10, 1, 13, 12
Assigned homework	10% of the final grade	0.5	0.02	11, 4, 3, 2, 9, 5, 6, 7, 8, 10, 1, 13, 12
Multiple-choice tests	81% of the final grade	4	0.16	11, 4, 3, 2, 9, 5, 6, 7, 8, 10, 1, 13, 12

Bibliography

Books:

1. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C., Carroll, S.B. (2008) "Genética". 8a edició. McGraw-Hill / Interamericana de España.
2. Pierce, Benjamin A. (2016). "Genética. Un enfoque conceptual", 5ª edición, Editorial Médica Panamericana

Web:

Aula Virtual de l'Autònoma Interactiva: <https://cv2008.uab.cat>

Sociedad Española de Genética: <http://www.segenetica.es/>