UAB
Universitat Autònoma de Barcelona

Genetics

Code: 100944
ECTS Credits: 3

2024/2025

Degree	Type	Year
2500253 Biotechnology	OB	1

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no official prerequisites. Even so, a basic knowledge of probability, combinatorics, and statistics is recommended. On the other hand, to ensure the student will properly follow the classes and achieve the learning outcomes proposed, it is essential to know the cellular processes studied in cytology, with particular emphasis on the cell cycle, mitosis, and meiosis.

Objectives and Contextualisation

The Genetics course aims to provide the students with the basic fundamentals of genetics, leaving the study of its molecular aspects to more advanced courses. The main objectives of the course are:

• Provide the students with the basic knowledge about the mechanisms and probabilistic aspects of biological inheritance

• Develop the ability to perform genetic analyses of different characters

• Develop the ability to interpret data and obtain conclusions, as well as the ability to apply theoretical knowledge to practical situations

Learning Outcomes

1. CM02 (Competence) Assess sex/gender inequalities at experimental level in the fields of human physiology and genetics.
2. CM03 (Competence) Work collaboratively in teams to solve problems and case studies in the field of biology.
3. KM01 (Knowledge) Describe the physiological basis of the organisation and functioning of living organisms.
4. SM02 (Skill) Correctly interpret data and observations in the field of biology.

5. SM03 (Skill) Relate relevant scientific data in different areas of biology.

Content

The contents of the course lectures can be divided into six different blocks:

Theoretical contents

1. Introduction to Genetics: basic concepts; Main areas and study methodologies; Genetics and biodiversity; Model organisms

2. Heritage patterns: Mendel's experiments, principles of segregation and independent transmission; dominance and recessiveness, incomplete dominance, codominance, multiple alleles, lethality, pleiotropy, environmental effects, penetrance and expressiveness, gene interaction, implications of sex in inheritance patterns; Mechanisms of sexual determination.

3. Genetic linkage and recombination: Chromosomes and linkage; Interchromosomal and intrachromosomal recombination; Mitotic crossing over; Gene mapping, linkage estimation between two or more genes, genetic maps and physical maps.

4. Mutations: gene mutations; structural chromosomal mutations; numerical chromosomal mutations.

5. Quantitative genetics: Genetic basis of continuous variation, phenotypic variation and additive phenotype distribution; heritability; natural and artificial selection.

6. Population genetics: dynamics of population genetic variation; allelic and genotypic frequencies; Hardy-Weinberg's law; forces of evolution

The contents will also be dealt with in an active manner through the resolution of problems:

Problems

2. Probabilistic nature of Mendel's laws.

2. Segregation analysis for monohybrid or polyhybrid crossings and distribution of the offsprings' phenotypes.

2. Pedigree analysis.

3. Calculation ofrecombination frequencies and chromosomal interference.

3. Determination of the order and the distances between linked genes.

5. Analysis of inheritance patterns and response to artificial selection of quantitative traits.

6. Calculation of genetic frequencies.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classes	16	0.64	

Problems' seminars	8	0.32
Type: Supervised		
Tutorials	5	0.2
Type: Autonomous		
Problem solving	18	0.72
Study	24	0.96

The teaching methodology is based on two approaches: a theoretical and a practical one.

Theoretical approach

Classes will give the students the basic knowledge needed to understand the course's contents. Support material will be available on the virtual campus. It is recommended that students take the presentations published in the CV to classes, in order to follow them easily and take notes, if necessary. The concepts explained in class will have to be autonomously deepened to promote the development of non-guided learning strategies. In order to facilitate this task, bibliography, audiovisual and interactive material will be provided. Finally, individual tutorials are planned for students who wish to do so. These tutorials should be used to potentiate the students' progress and to help them understand the most difficult or complex concepts.

Practical approach

Problem seminars will be used to learn how to apply the previously-acquired knowledge. Students will find the problems that will be treated on each seminar on the Virtual Campus. Seminars will be given in reduced groups and will be based on the discussion and the resolution of practical problems, applying theoretical concepts together with mathematical tools and statistics. Students who want it can request individual tutorials to facilitate the understanding of the most complex problems.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
First block exam	33%	1.5	0.06	CM02, KM01, SM02, SM03
Group assignments	33%	1	0.04	CM02, CM03, KM01, SM02, SM03
Second block exam	33%	1.5	0.06	CM02, KM01, SM02, SM03

A continuous formative evaluation will be carried out to assess the understanding of acquired knowledge and correct errors in autonomous learning techniques. This evaluation, subject to grading, will be divided into two partial exams (67% of the grade) and solved problems submissions (33%). A minimum overall grade of 5.0 is required to pass the subject. The minimum passing grade for each exam is 4.0. An average grade of 5.0 across the two exams is necessary to pass.

Exams will consist of two partial tests, each covering half of the syllabus and including content and problem-solving questions. Students who do not pass one or both partial exams (grade less than 5.0) will need to take a final recovery exam for the failed sections. The final test is also available to any student wishing to improve their grade, although the original grade will be canceled.

To participate in the recovery exam, students must have been evaluated in activities accounting for at least two-thirds of the total grade. Students will receive a grade of "Not Evaluable" if their completed evaluation activities weigh less than 67% of the final grade. The recovery exam will cover the subjects of the failed evaluations.

Students opting for a single evaluation will take the same recovery exams. The average grade of these two recovery exams will account for 67% of the final grade, with problem submissions comprising the remaining 33%. A minimum overall grade of 5.0 is required to pass the subject. The minimum passing grade for each exam is 4.0. An average grade of 5.0 across the two exams is necessary to pass.

Bibliography

Benito, C. 1997. 360 problemas de Genética. Resueltos paso a paso. Editorial Síntesis, Madrid.

Griffiths, A.J.F., S.R. Wessler, R.C. Lewontin & S.B. Carroll. 2008. Genética. 9a. edició. McGraw Hill - Interamericana.

Jiménez Sánchez, A. 2008. Problemas de Genética para un curso general. Colección manuales UEX-52. Servicio de Publicaciones, Universidad de Extremadura.

Ménsua, J.L. 2003. Genética. Problemas y ejercicios resueltos. Pearson Prentice Hall.

Pierce. B.A. 2011. Fundamentos de Genética. Conceptos y relaciones. 1a. edició. Editorial Médica Panamericana.

Pierce. B.A. 2016. Genética. Un enfoque conceptual. 5a. edición. Editorial Médica Panamericana.

Software

Does not apply.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	411	Spanish	second semester	afternoon
(PAUL) Classroom practices	412	Spanish	second semester	afternoon
(TE) Theory	41	Spanish	second semester	afternoon