Universitat Autònoma de Barcelona

2021/2022

Genetics

Code: 100891
ECTS Credits: 6

Degree	Type	Year	Semester
2500252 Biochemistry	FB	2	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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: No

Other comments on languages

Even though the linguae francae of this course are Spanish and Catalan, part of the study material is in English

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 be able to follow the classes and achieve the proposed learning outcomes, a thorough comprehension of the cellular processes studied in cytology is advised, with particular emphasis on the cell cycle, mitosis, and meiosis.

Objectives and Contextualisation

The overall objective of this course is that students receive a general introduction to the basic principles of Genetics to understand the laws of heredity, its cytological and molecular basis, and its variation at the population level.

The training objectives are as follows:

1) Understand the need for the study of genetics in the context of biochemistry.

2) Know the laws of the transmission of genetic information, the chromosomal theory of inheritance, and how to make genetic maps and interpret pedigrees.

3) Know the structure, organization and function of the genetic material.

4) Know how to use and interpret genomic data.

5) Know the main sources of genetic variability in populations.

Competences

- Be able to self-evaluate.
- Collaborate with other work colleagues.
- Display knowledge of the biochemical and genetic changes that occur in many pathologies and explain the molecular mechanisms involved in these changes.
- Interpret experimental results and identify consistent and inconsistent elements.
- Manage bibliographies and interpret the information in the main biological databases, and also know how to use basic ICT tools.
- Manage information and the organisation and planning of work.
- Stay abreast of new knowledge of the structure, organisation, expression, regulation and evolution of genes in living beings.
- Take responsibility for one's own learning after receiving general instructions.
- Think in an integrated manner and approach problems from different perspectives.
- Understand the language and proposals of other specialists.
- Use ICT for communication, information searching, data processing and calculations.

Learning Outcomes

1. Analyse a pedigree thoroughly and define the types of inheritance of a particular genotype and phenotype.
2. Be able to self-evaluate.
3. Calculate data related to physiological processes in animals.
4. Collaborate with other work colleagues.
5. Describe genetic alterations that can be found to underlie certain pathologies.
6. Describe the determining factors in evolution.
7. Explain the fundamental principles of genetics and reproduction.
8. Interpret experimental results and identify consistent and inconsistent elements.
9. Manage information and the organisation and planning of work.
10. Solve practical problems in genetics (including population genetics).
11. Take responsibility for one's own learning after receiving general instructions.
12. Think in an integrated manner and approach problems from different perspectives.
13. Understand the language and proposals of other specialists.
14. Use ICT for communication, information searching, data processing and calculations.

Content

Unit 1: Genetics and its fundamental concepts.

Unit 2: Mendelian principles.

Unit 3: Genetic consequences of mitosis and meiosis. Chromosomal theory of heredity. Biological cycles and reproduction.

Unit 4: Sex determination. Sex's influence on inheritance patterns. Genealogy analysis.

Unit 5: Extensions of Mendelian inheritance.

Unit 6: Non-Mendelian inheritance.

Unit 7: Geneic linkage and recombination in eukaryotic organisms.

Topic 8: The genetic code, the double helix and the flow of genetic information.

Topic 9: Fundamental aspects of replication, transcription and translation.

Topic 10: Mutations, mutagens and DNA repair systems.

Topic 11: Quantitative inheritance and heritability.

Unit 12: Population and evolutionary genetics.

*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents."

Methodology

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

Theoretical approach

The theoretical part aims to provide the basic knowledge needed to understand each topic. The multimedia tools that will be used will be available at the Virtual Campus. Furthermore, students will have to deepen these concepts autonomously to improve their knowledge and develop non-guided learning strategies. To facilitate these tasks, bibliographic, multimedia, and interactive material will be provided. Finally, individual tutoring sessions are planned if students require them. These sessions should allow the professor to calibrate the progress of the students and to help them understand the most complex concepts.

Practical approach

Problem-solving material will be provided to learn how to apply theoretical knowledge to practical exercises. The students will find the problems to solve in the Virtual Campus, and they will work them by applying theoretical concepts concomitantly with mathematical and statistical tools. Students can also request individual tutoring sessions to facilitate the understanding of the most complex problems.

*The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Group tutorials	2	0.08	8, 12
Lectures	30	1.2	1, 5, 6, 7, 9, 8, 12, 11
Problem classes and seminars	10	0.4	14, 3, 8, 10
Type: Supervised			
Individual tutorials	9	0.36	8, 12
Type: Autonomous			
Bibliographic search	9	0.36	14, 8, 11
Consultation of recommended books	9	0.36	9, 8, 12, 11
Problem resolution	15	0.6	1, 3, 4, 8, 12, 10
Study	62	2.48	9, 12, 10, 11, 2

Assessment

Evaluation

The subject will be evaluated by 2 written tests that correspond to both theoretical and practical problems. The quality of the students' work will also be taken into account. The evaluation system considering the specific weight of each part will be as follows:

1. Exams. There will be 2 midterm exams to evaluate the progressive understanding and acquisition of the contents. The exams weight 60% of the final mark. To pass the exam it is necessary to have a 5.

2. Evaluation of 2 assignments in terms of its presentation, structure, clarity, content and synthesis capacity. This concept represents 40% of the final mark.

3. Retake examination. It will correspond to the part or parts not previously passed. It may also serve to improve the mark. A minimum of 5 is needed in every evaluation to pass the course.

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. Thus, the student will be graded as "No Avaluable" if the weighthing of all conducted evaluation activities is less than 67% of the total final score.

*Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Groupal assignments	40%	0	0	14, 3, 4, 13, 9, 12, 10, 11, 2
Two midterm exams (First: 30%; second: 30%)	60%	4	0.16	1, 3, 5, 6, 7, 9, 8, 12, 10

Bibliography

- Genética: un enfoque conceptual 5a edición
https://cataleg.uab.cat/iii/encore/record/C__Rb1986451__Sgenetica%20un%20enfoque%20conceptual__Orightre

- Genetics for dummies, 2nd Edition https://mirades.uab.cat/ebs/items/show/195094

Consulting the Virtual Campus of the course is recommended.

Software

No specific software is available.