Universitat Autònoma de Barcelona

2021/2022

Molecular Genetics

Code: 100776
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	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: Yes

Other comments on languages

completa

Teachers

María Pilar García Guerreiro

Prerequisites

It is recommended to have passed the general course of Genetics.

Objectives and Contextualisation

This course takes place in the second-year of the Genetics degree providing the fundamental molecular knowledge of inheritance. The course is focus to give the current information on Molecular Genetics regarding gene structure and function,

DNA replication, transcription and translation, as well as regulatory mechanisms of the transmission of the genetic information. In addition, practical knowledge of the main techniques for manipulation of the genetic material are provided. Then, this course looks at the molecular basis of inheritance which principles were learned during the first year in the Genetics course.

The educational objectives are as follows:

1) Acquisition of the basic concepts in molecular genetics as well as the composition of the nucleic acids and their roles in the molecular processes.

2) To obtain the essential knowledge about the processes driving the flow of genetic information, from DNA replication, transcription and translation in the organisms.

3) To be familiar with the regulatory processes of gene expression.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Be able to analyse and synthesise
- Be able to organise and plan.
- Develop a historical vision of biology.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Obtain information, design experiments and interpret biological results.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Understand the processes that determine the functioning of living beings in each of their levels of organisation.
- Work in teams.

Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Analyse the sex- or gender-based inequalities and the gender biases present in one's own area of knowledge.
3. Be able to analyse and synthesise.
4. Be able to organise and plan.
5. Critically analyse the principles, values and procedures that govern the exercise of the profession.
6. Design experiments in genetics, and interpret the data obtained.
7. Propose new methods or well-founded alternative solutions.
8. Propose projects and actions that incorporate the gender perspective.
9. Propose viable projects and actions to boost social, economic and environmental benefits.
10. Relate the nature and organisation of genetic material in the cell to the control of gene expression at different points in the cell cycle.
11. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
12. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
13. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
14. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
15. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
16. Summarise the most important historical milestones in cell biology and genetics and appreciate their contributions to present-day biology.

17. Use the bibliographic sources specific to cell biology and genetics to work independently on acquiring further knowledge.
18. Work in teams.

Content

Content

1. Introduction to Molecular Genetics.
2. The nature of genetic material.
3. Structure of the chromosome.
4. Replication of genetic material and replication enzymes.
5. DNA Recombination and repair.
6. Transcription.
7. Types of RNA and processing mechanisms.
8. Genetic code and the translation process.
9. Prokaryotic and eukaryotic gene regulation.
10. Genome organization

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

Methodology

Lectures:

Lectures are based on master classes with ICT support. Emphasis is made to acquisition of important concepts and skills for the students. Also the use of diverse information sources facilitates the understanding of complex issues. Lectures do not offer much interaction but using diverse ICTs (ex. video projection) encourage discussion and dynamism along the lessons.

Problems-Seminars:

The sessions are performed in small groups which allow to deepen the information given on the master class and to work on specific areas of the course. These sessions promote students to apply the theoretical knowledge to solve practical problems, as well as to demonstrate their skills by solving problems on the blackboard. In addition, students have to debate practical cases, and to make the oral presentation of topics proposed in class.

Tutorials:

Here the student has the possibility to raise specific doubts related to the course. This is an essential teaching complement that allows to provide individual attention to the students.

Practices:

These sessions are done in small groups. Here the student have the opportunity to work at the laboratory doing experiments related to practical cases of the subject. The data obtained in the experiments are analyzed and a global view of the techniques used is given.

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			
Laboratory practices	12	0.48	6, 18
Lectures	35	1.4	10, 16, 3, 17
Problems-seminars sessions	3	0.12	6, 3, 4, 18
Type: Supervised			
Tutorials	6	0.24	
Type: Autonomous			
Search of bibliography	3	0.12	6
Solving problems	6	0.24	6, 18
Study	77	3.08	6, 10, 16, 3, 4, 17

Assessment

The evaluation of the competences is done as follows:

1. The students perform two midterm exams to evaluate the contents of theory and problems. It is necessary to obtain a grade ≥ 5 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. The average grade obtained by this concept represents 75% of the final subject grade. 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. If the student do this exam to improve the grade, only the grade of the last exam will be valid.

2. Evaluation of practices. A test will be made for each module of the practical sessions. The grade of practices is the average grade of modules grade, and represents 20% of the final grade of the course. To pass the course it is necessary to take the questionnaires of practices and obtain an average grade equal to or greater than 5. Questionnaires not completed will have a score of zero. The student will be able to overcome any failed tests through a second-chance exam. Attendance at practical sessions is mandatory. The students will not pass the course when their absence to practical sessions is superior to 20% of the programmed sessions.

3. The evaluation of the assigned homework related to the subject represents 5% 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 practices and the assigned homework.

The student will be graded as "No Avaluable" if the weighthin of all conducted evaluation activities is less than 67% of the 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
Assigned homework	5% of the final grade	0	0	2, 1, 6, 8, 13, 10, 16, 3, 4, 18, 17

Evaluation of practices	20% of the final grade	2	0.08	5, 6, 9, 11, 12, 10, 3
Midterm exams	75% of the final grade	6	0.24	7, 15, 14, 10, 3, 4

Bibliography

1) Pierce, B.A. 2016. Genética. Un enfoque conceptual. (5th edition). Ed. Médica Panamericana. Online library access (https://www.uab.cat/biblioteques)

2) Watson, J.D.; Baker, T.A.; Bell, S. P.; Gann, A.; Levine, M.; Losick, R. 2016. Biología Molecular del Gen. (7 th edition). Editorial Médica Panamericana. Online library access (https://www.uab.cat/biblioteques)

3) Krebs, J.E.; Goldstein, E. S.; Kilpatrick, S.T. 2017. Lewin's Genes XII (12th edition). Jones and Bartllet Publishers.

4) Brown, T.A. 2007. Genomes. (3rd Edition). Ed. Médica Panamericana.

Web links:
-Campus virtual interactiu https://cv2008.uab.cat

Software

No