66030 - Advanced methods in molecular and cellular biology

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	537 - Master's in Molecular and Cellular Biology
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

As an optional subject of the Master of Molecular and Cellular Biology, the course is based on the knowledge acquired in the following subjects: Cell Biology, Molecular Genetics, Genetic Engineering, Immunology, Molecular Biology and Medicine, as well as in Methodos in Biochemistry or equivalent subjects taught in degrees that give access to this Master. On this basis, the student will deepen in the important aspects of technology in Molecular and Cellular Biology.

The participation of leading specialists in their respective areas will allow the students to acquire an overview of the latest developments in the techniques of Molecular and Cell Biology

The working material of the course will be in Spanish and partly in English, so the student will need a level of understanding written those languages.

1.2.Recommendations to take this course

To follow this course, the student must have a basic knowledge of Molecular and Cellular Biology techniques including those related to the analysis of genes and proteins and the identification of cells and organelles.

1.3.Context and importance of this course in the degree

All work is aimed to make the students know delve into the latest advances in techniques of molecular and cellular biology.

1.4.Activities and key dates

Theoretical lessons, case studies and seminars: First semester. Timing: from 16 to 18h.

Deadline for submission of written work: last school day before Christmas holiday

Tutorials: Will be announced at the beginning of the course

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2.Learning goals

2.1.Learning goals

For passing this subject, the student should demonstrate to be able to:

- Assess of the relevance of developments in the field.

- Planning the molecular cloning of a gene, site-directed mutagenesis experiments, genetic analysis of diseases, functional study, propose methods to use, carry them out, and interpretation of the results.

- Searching, analysis and transmission of information on specific aspects of molecular and cell biology.

- Solve specific problems that might arise in a laboratory of molecular and cellular biology

- Present its work

2.2.Importance of learning goals

As a result of following this course, students will be able to select the most appropriate technique when addressing a problem to solve in the identification and analysis of cells, genes, proteins or metabolites. In turn it will know how to tackle more efficiently the characterization of the different cells and biomolecules.

3.Aims of the course and competences

3.1.Aims of the course

The overall objective of this subject is to deepen the student's knowledge on manipulation techniques and analysis of genetic material, collection, purification and characterization of proteins, immunology, cell culture, electron microscopy, electrochemical sensors, as well as the most important applications of these techniques. This objective will be acquired through lectures, solving practical cases in the classroom and presentation of papers.

With the development of personal work it is intended to deepen students' prior knowledge and acquire additional skills related to finding information and critical analysis, writing and communication of scientific content, etc.

3.2.Competences

After passing this course, the students will be:
1. Competent to design the most appropriate methodology to answer the questions presented in the field of Molecular and Cellular Biology.
2. Able to assess the relevance of developments in the field.
3. Capable to search and critically analyze specific information.
4. Competent for presentations and exhibitions of issues related to technology Molecular and Cell Biology.
5. Able to identify the most appropriate strategy to achieve the best result to solve a particular problem in the field of molecular and cellular biology techniques.

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4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he/she has achieved the intended learning outcomes through the following evaluation activities

1. Active participation in seminars, theoretical and case study sessions. It is scored from 0 to 10 and will contribute 15% to the final grade.

2. Presentation of an individual work

Work will focus on a topic related to the subject, each student take shape with the teacher. The work must be in writing and signed by the student.

Evaluation criteria and levels of demand:

The presentation of a written work will be required to pass the course. It is scored from 0 to 10 and will contribute 35% to the final grade. The evaluation criteria are as follows:

Consistency of information.

Clarity of concepts.

Degree of preparation of the presentation.

Degree of internalisation of content with critical analysis and own suggestions.

3. Making an objective test

The test consists of a series of multiple choice questions about the theoretical contents of the subject.

The test consists of 20 multiple choice questions on the content of the theoretical program of the subject. It is scored from 0 to 10 and will contribute 50% to the final grade

The objective test will take place the day and time indicated in the Moodle platform of the University of Zaragoza https://moodle2.unizar.es/add/ and the moodle of the subject.

TO APPROVE THE SUBJECT IS AN ABSOLUTE REQUIREMENT to pass this test WITH A MINIMUM OF 5 points out of a total of 10.

In addition, to pass this subject, students must achieve a minimum overall score of 5 out of a total of 10.

For those students who have to appear in successive calls for not having passed the subject on first call, the evaluation will consist of the same tests for students in first call, with the following features:

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Students who in previous calls have obtained at least 5 points in the presentation of individual work will not have the obligation to submit a new job.

The date and place of different to the first calls will be announced in the Moodle platform of the University of Zaragoza https://moodle2.unizar.es/add/.

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

This course is designed to address the learning of theoretical knowledge with different specialists. To achieve this goal, in the lectures a large number of teachers, with different backgrounds, is involved to allow students a wider vision of the field.

This strategy will allow the students to review a topic in detail with the supervision of an outstanding professional, who can provide further professional development in the field, when choosing and carry out their thesis project.

5.2.Learning tasks

The course includes the following learning tasks:

1. Classroom activities: Lectures, presentation and discussion of practical cases (30 hours). Participatory lectures. Basic theoretical knowledge of the course is presented to students. The last 2 sessions will be dedicated to solve practical cases.

2. Seminars (10 hours).

3. Presentation of an assignment (30 hours). Autonomous work. In this activity students should collect information on a particular topic, helped by the teacher. The teacher will monitor the individual work of students by scheduling tutoring sessions. Finally, the assignment will be presented to the teacher.

3. Tutorials (10 hours).

4. Assessment. Objective test lasts 1 hour. 40 hours of autonomous work.

5.3.Syllabus

The course will address the following topics:

Topic 1. Introduction to Molecular / Cell Biology and applications. critical analysis of technologies for nucleic acid research.

Topic 2. DNA matrix: DNA Chips. Applications.

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Topic 3. Applications of Flow Cytometry

Topic 4. Functional analysis of promoters. Techniques for the study of DNA-protein interaction. Applications.

Topic 5. Multidimensional optical microscopy

Topic 6. Methods of study of miRNAs. Applications.

Topic 7. Development of biosensors for monitoring "in situ" biodegradation of oil spills at sea

Topic 8. Proteomics techniques / immunochemistry

Topic 9. New techniques for DNA sequencing

Topic 10. Analysis of the Oxphos function. Generating mutant mitochondrial DNA. Polarography. Mitochondrial protein synthesis (35S) mitochondrial proteomics by Gene-trapping

Topic 11. Introduction to research techniques in Neurosciences: neuronal culture for the study of diseases of the nervous system

Topic 12. Epigenetics: Concepts, analysis techniques and biomedical applications

Case Studies (I)

Case Studies (II)

IMPORTANT: The order of the topics may change depending on the agendas of visiting researchers.

Coordinator: Dr. Maria F. Fillat

5.4.Course planning and calendar

Lectures, case studies and seminars:

First Semester, (the course will begin during the second half of October)

Hours: 16:00 to 18:00 h.

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Location: It will be indicated on the Faculty of Science website .

During the teaching period, students may contact the teachers who presented their topic of interest to select their assignement.

Deadline for submission of written assignments: Last school day before Christmas vacation.

Supervision and assignment review: to be informed in class.

5.5.Bibliography and recommended resources

Bibliographic records for this subject will be indicated along each theoretical session

Slides of lessons will be available in the Moodle platform at UNIZAR