66030 - Advanced methods in molecular and cellular biology

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	537 - Master's in Molecular and Cellular Biology
ECTS	6.0
Course	1
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.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.

1.2.Activities and key dates for the course

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

2.Initiation

2.1.Learning outcomes that define the subject

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

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- Present its work

2.2.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.

3.Context and competences

3.1.Goals

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.Context and meaning of the subject in the degree

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

3.3.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.

3.4.Importance of learning outcomes

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.

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4.Evaluation

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.Activities and resources

5.1.General methodological presentation

The learning process that is designed for this subject is based on the following:

This course is scheduled to address an intensification of theoretical knowledge in contact with different specialists. To achieve this goal, in the theoretical sessions are involved a large number of teachers with different backgrounds that allow students a wider vision of the field.This strategy will allow the student to revise a topic closely with an outstanding professional who will approach a research aspect which can provide further professional development in the field when choosing and carry out their thesis project.

5.2.Learning activities

The program includes the following activities ...

1. Classroom activities: Lectures, presentation and discussion of practical cases.

30 hours. Participatory lectures. Basic theoretical knowledge of the subject is presented to students . The last 2 sessions will be devoted to solving practical cases.

2. Seminars

10 hours

3. Presentation of a job.

Distance, 30 hours. In this activity students should collect information on a particular topic, aided by the teacher. The teacher will monitor the individual work of students by scheduling tutoring sessions. Finally, the work will be presented to the teacher.

3. Tutorials.

10 hours of tutoring.

4. Objective test.

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1 hour; non-contact, 40 hours.

5.3.Program

Coordinator: Dr. Maria F. Fillat

During the theoretical sessions the topics listed below will be discussed. IMPORTANT: The order of exposing them may change depending on the agendas of visiting researchers.

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

- DNA matrix: DNA Chips. Applications.

- Applications of Flow Cytometry

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

- Multidimensional optical microscopy

- Methods of study of miRNAs. Applications.

- Development of biosensors for monitoring "in situ" biodegradation of oil spills at sea

- Proteomics techniques / immunochemistry

- New techniques for DNA sequencing

- Analysis of the Oxphos function. Generating mutant mitochondrial DNA. Polarography. Mitochondrial protein synthesis (35S)

mitochondrial proteomics by Gene-trapping

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

- Epigenetics: Concepts, analysis techniques and biomedical applications

- Case Studies (I)

- Case Studies (II)

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5.4.Planning and scheduling

Schedule of classroom sessions and presentation of works

Lectures, case studies and seminars:

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

Hours: 16:00 to 18:00 h.

Location: It will be indicated on the Science School website .

During the teaching period, students may contact the teacher who exposed them to the topic of interest to select their work.

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

Mentoring (supervision and review of work): to be informed in class

5.5.Bibliography and recomended 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