

Methods of Molecular Microbiology

Code: 42933
ECTS Credits: 6

Degree	Type	Year	Semester
4313775 Applied Microbiology	OB	0	1

Contact

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Use of languages

Principal working language: spanish (spa)

Teachers

Maria Pilar Cortés Garmendia
Jesús Aranda Rodríguez

Prerequisites

It is recommended previous knowledge on Molecular Microbiology and Genetic Engineering of Microorganisms.

Objectives and Contextualisation

In this methodological module will be deepened in the knowledge of modern molecular Microbiology techniques, in order that the students acquire advanced knowledge that allows them to elaborate experimental procedures to study current topics of applied Microbiology.

Skills

- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Continue the learning process, to a large extent autonomously.
- Design and apply scientific methodology in problem solving.
- Develop critical reasoning within the subject area and in relation to the scientific or business context.
- Display knowledge of the most up-to-date methodology used in environmental, molecular, industrial and clinical microbiology.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use scientific terminology to account for research results and present these orally and in writing.

Learning outcomes

1. Apply the most appropriate molecular methodologies for studying and resolving problems related to microbiological issues in health, environment and industry.
2. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.

3. Continue the learning process, to a large extent autonomously.
4. Design and apply scientific methodology in problem solving.
5. Develop critical reasoning within the subject area and in relation to the scientific or business context.
6. Know and understand the bases for current techniques in molecular microbiology that are used in the various areas of applied microbiology.
7. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
8. Use scientific terminology to account for research results and present these orally and in writing.

Content

The course will have the following contents:

- Current methods for the genetic modification of microorganisms.
- Molecular tools based on DNA for the classification of microorganisms and epidemiological studies.
- Application of the different omics (genomics, transcriptomics, etc ...) to the resolution of microbiological problems.
- Use of metagenomics and metatranscriptomics techniques in the characterization of complex microbial samples and their possible applications.
- Elaboration of experimental protocols for the study of topics of current interest in the field of applied Microbiology.

Methodology

This module will be taught following the project-based learning method (PBL). The class group will be divided into small groups that will work independently to solve the proposed project.

In the first classroom session, the teaching staff will present the project proposal, the general characteristics of the project and the working guidelines as well as the distribution of sessions. During the development of the work sessions, teachers will provide the necessary material and tools to guide students, and simultaneously stimulate discussion and critical knowledge among the working group members.

If it is considered necessary for the resolution of some aspect of the project, the teaching staff may give some participatory master classes to expand or deepen certain knowledge.

The members of the working groups must identify and assume the responsibilities and tasks necessary to solve the problem. They must also work individually to investigate, select and manage the information obtained to participate in the discussions with the rest of the group members in order to re-elaborate and expand their knowledge.

Finally, each group will discuss and discuss with the rest of the class the problem solving and its possible application in a more global context.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Classroom tutorship	4	0.16	1, 5, 4, 8
Project-based learning	30	1.2	1, 6, 5, 4, 7, 2, 3, 8

Type: Supervised				
Experimental design of the proposed project	20	0.8	1, 6, 4, 7, 3	
Preparation of oral presentation and defense of the work done	20	0.8	1, 6, 5, 2, 8	
Type: Autonomous				
Information search and management	30	1.2	5, 8	
Integrate information and formulate hypotheses	10	0.4	1, 6, 5, 4, 7, 3, 8	
Preparation of work plans and oral presentations	20	0.8	1, 6, 5, 4, 7	
Reading recommended texts	10.5	0.42	6, 8	

Evaluation

To pass the module is mandatory the attendance to the classroom sessions indicated by the teachers.

The evaluation will be made according to the following distribution:

1. Individual written exam. It will consist of a specific written test where the skills worked during the development of the project will be assessed. The maximum score is 5 points out of 10.

2. Delivery of report (s) and/or oral presentation (s). The number and specific weight of each delivery and/or oral presentation will be indicated in the presentation session of the project, in which the teachers will also establish the guidelines of each one. The maximum rating for this section is 4 points out of 10.

3. Participation and involvement of the student in the resolution of the project. The maximum rating for this section is 1 point out of 10.

The final grade of the module will be the weighted average of each of the evaluation typologies indicated. Likewise, to pass the module it is needed to obtain a score equal to or greater than 2.5 points over the 5 established in the individual written exam. Otherwise, the student must perform and pass a second chance evaluation on the scheduled date. In this case, the student will obtain a maximum score of 4 out of 10, and a minimum of 2 over the 4 established is needed to pass the individual assessment.

To pass the module the final grade must be equal to or greater than 5.

Students that pass the exam but would like to improve the written exam score, they can perform a qualification improvement test that will be done the same day of the second chance evaluation, renouncing the previously obtained grade in this section. Students wishing to take the test must contact by mail with teaching staff at least 72 hours before the scheduled day. The students can obtain a maximum rating of 5 points out of 10. And it is necessary to obtain a minimum of 2.5 points out of the maximum 5 to overcome it.

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 or module. Thus, the student will be graded as "No Valuable" if the weight of all conducted evaluation activities is less than 67% of the final score.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Delivery of reports and/or oral presentation/s	40%	1.5	0.06	1, 6, 4, 7, 2, 8

Individual written exam	50%	3	0.12	1, 6, 5, 4, 7, 2, 8
Participation	10%	1	0.04	5, 3

Bibliography

It will be the student's responsibility to search and consult the bibliography necessary for the resolution of problems. For this task will be advised by the faculty of the module.