

Microbian Biotechnology

Code: 42900
ECTS Credits: 9

Degree	Type	Year	Semester
4313772 Advanced Biotechnology	OB	0	1

Contact

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Use of Languages

Principal working language: spanish (spa)

Other comments on languages

The vehicular language is Spanish and some sessions will be given in English

Teachers

Montserrat Llagostera Casas

Antonio Villaverde Corrales

Maria Pilar Cortes Garmendia

Escarlata Rodriguez Carmona

Esther Vázquez Gómez

José Luis Corchero Nieto

Elena Garcia Fruitós

External teachers

Antonio Barreiro Vázquez

Antonio Párraga Tajuelo

Marí Aldea Malo

Prerequisites

Good knowledge of microbial metabolism and physiology, molecular microbiology and culture techniques, genetic manipulation of microorganisms and engineering of recombinant proteins are required.

Objectives and Contextualisation

The objective of this module is to provide students with an overview of microorganisms of industrial interest, microbial diversity and their potential on an industrial scale in production / transformation processes.

There will also be several microbial products of industrial and biomedical interest, especially proteins, and how microbial cell factories can be used for the production and adaptation of the same for biotechnological and biomedical applications.

Competences

- Combine knowledge of microbial genetics and physiology with the methodologies of bioprocess engineering in Cell Factory applications .
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Comparatively integrate physiological microbial diversity and the potential application of microbial products and transformations mediated by microorganisms in the biotechnological, pharmaceutical and food industries.
- Handle the biological methodologies and principles that underpin the microbial production of recombinant proteins.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use and manage bibliography and IT resources related to biotechnology responsibly.

Learning Outcomes

1. Apply basic concepts in microbiology to industrial processes based on biotechnology.
2. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
3. Determine the best genetic strategies for the production of recombinant proteins.
4. Determine the most appropriate type of process for a microbial production strategy.
5. Determine which types of microbial products are potentially of interest in biotechnology.
6. Integrate molecular and physiological tools and strategies in microbial production and transformations.
7. Recognise microbial diversity as a biotechnological offer for the cell factory.
8. Show scientific judgement in choosing the appropriate organism to produce high-quality recombinant proteins.
9. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
10. Use and manage bibliography and IT resources related to biotechnology responsibly.

Content

- R+D+I to obtain a product or a microorganism of industrial interest
- The concept of Cellular Factory: Microbial production of enzymes and recombinant drugs
- Experimental design in microbial biotechnology
- Production of recombinant proteins in bacteria, yeast, mammalian cells, insect cells and filamentous fungi
- Recombinant proteins for non-viral gene therapy
- Microbial nanobiotechnology
- Microbiology in different industrial sectors
- Visits to companies, related to the theoretical contents

Methodology

This module consists of two parts. The first one will be given through lectures and one work in the classroom. The second part will be developed through lectures given by microbiology specialists of different industries and one visit to companies related to microbiology. It is necessary 60 % attendance to the lectures.

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			
Visits to technology centers and companies	4	0.16	9
Lectures	36	1.44	1, 3, 5, 8, 4, 7
Type: Autonomous			
Personal study	90	3.6	1, 3, 5, 8, 4, 6, 9, 7, 10
Preparation of an oral presentation	27	1.08	5, 4, 6, 9, 2, 10
Preparation of group work	65.75	2.63	1, 9, 2, 10

Assessment

The module will be evaluated through an individual written test (consisting of two typologies of questions), the delivery of a work done in a group, and an oral dissertation. To pass the module, a weighted average mark of 5 or higher must be obtained, and a mark of 5 or higher on the individual written evaluation. If this qualification is not obtained, the individual evaluation can be reassessed.

If the written report contains more than 10% of a literal copy of previously published works, the module will not be approved.

In order to take part in the remedial exam, students must have previously been assessed in a set of activities, the weight of which is equivalent to a minimum of two-thirds of the total qualification of the subject. Therefore, students will obtain the qualification of "Not Assessable" when the assessment activities carried out have a weighting of less than 67 % in the final qualification.

In the event that the student wishes to improve the individual assessment grade, he/she may opt for a grade improvement test to be held on the same day as the remedial test, waiving the grade obtained previously in this section. Students who wish to take this test must contact the module teaching staff in writing at least 72 hours before the scheduled day of the test. You must obtain a minimum of 5 in order to pass the test.

In order to pass the module, attendance of at least 60 % of the lectures is compulsory.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of group assignments: written report	25	0	0	1, 3, 5, 8, 4, 6, 9, 2, 7, 10
Evaluation of group assignments: oral presentations	15	0.25	0.01	1, 3, 5, 8, 4, 6, 9, 2, 7
Individual evaluation: multiple choice test	30	1	0.04	1, 3, 5, 8, 4, 6, 9, 7

Individual evaluation: short questions	30	1	0.04	1, 3, 5, 8, 4, 6, 9, 7
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Bibliography

The necessary basic and specific bibliography will be published on the moodle course. The databases will be indicated to obtain the necessary material for the individual works.

Software

No specific software is foreseen.