

**Microbial 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 Cortés Garmendia

Escarlata Rodriguez Carmona

Esther Vazquez Gomez

José Luis Corchero Nieto

**External teachers**

Antonio Barreiro Vázquez

Antonio Párraga Tajuelo

Elena García Fruitós

Marí Aldea Malo

Ursula Rinas

**Prerequisites**

Good knowledge of microbial metabolism and physiology, molecular microbiology and culture techniques, genetic manipulation of microorganisms and purification 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 biotechnological and biomedical applications.

## Skills

- 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

- Principles of industrial microbiology
- R+D+I to obtain a product or a microorganism of industrial interest
- Study cases
- Microbiology for food and beverage production
- Microbiology in different industrial sectors
- Microbial production of enzymes and recombinant drugs
- Visits to companies, related to the theoretical contents
- The concept of Cellular Factory

- Experimental design in microbial biotechnology
- Development of biopharmaceutical products for industry; Molecular principles
- Comparative introduction in the microbial production of recombinant proteins
- Production of recombinant proteins in bacteria
- Production of recombinant proteins in yeasts
- Production of recombinant proteins in filamentous fungi
- Production of recombinant proteins in mammalian cells
- Production of recombinant proteins in insect cells
- Recombinant proteins for non-viral gene therapy
- Microbial nanobiotechnology

## Methodology

We will use master classes taught by experts and visits to companies in the sector to offer a broad view of the biotechnological potential of microorganisms.

## Activities

Title	Hours	ECTS	Learning outcomes
<b>Type: Directed</b>			
Visits to technology centers and companies	11	0.44	9
Lectures	40	1.6	1, 3, 5, 8, 4, 7
<b>Type: Supervised</b>			
Preparation of an oral presentation	15	0.6	5, 4, 6, 9, 2, 10
Preparation of group work	39	1.56	3, 8, 2, 10
<b>Type: Autonomous</b>			
Personal study	90	3.6	1, 3, 5, 8, 4, 6, 9, 7, 10
Preparation of an oral presentation	20	0.8	5, 4, 6, 9, 2, 10

## Evaluation

To pass the subject you must obtain a weighted average mark of 5 or higher and a mark of 5 or higher on the individual written test.

We consider that a student will be graded as not evaluable "NO AVALUABLE" if the assessment of all conducted evaluation activities does not allow students to achieve the overall grade of 5 on the assumption that they had obtained the highest grade in all of them.

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Evaluation of oral and written presentation of works	40	8	0.32	1, 3, 5, 8, 4, 6, 9, 2, 7, 10
Individual written evaluation	60	2	0.08	1, 3, 5, 8, 4, 6, 9, 7

## 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.