



# Course guide

## 295585 - 295PB014 - Biotechnological Processes

Last modified: 24/05/2024

**Unit in charge:** Barcelona East School of Engineering  
**Teaching unit:** 713 - EQ - Department of Chemical Engineering.

**Degree:** MASTER'S DEGREE IN POLYMERS AND BIOPLASTICS (Syllabus 2024). (Compulsory subject).

**Academic year:** 2024    **ECTS Credits:** 3.0    **Languages:** English

### LECTURER

**Coordinating lecturer:** Saperas Plana, Nuria

**Others:**

### REQUIREMENTS

A lab coat is required for the laboratory sessions. Attendance to these sessions is mandatory.

### TEACHING METHODOLOGY

- Lectures using both audiovisual media and the blackboard, and encouraging students' participation.
- Problems and cases to solve individually or in small groups.
- Laboratory classes. Experiments will be performed in small groups.

### LEARNING OBJECTIVES OF THE SUBJECT

To provide future engineers with the basic knowledge and tools that will allow them to understand, interact and easily integrate in a biotechnological industry.

### STUDY LOAD

| Type              | Hours | Percentage |
|-------------------|-------|------------|
| Hours small group | 8,0   | 10.67      |
| Hours large group | 13,0  | 17.33      |
| Self study        | 54,0  | 72.00      |

**Total learning time:** 75 h



## CONTENTS

### Introduction to biotechnology and biomolecules

**Description:**

Definition, development and main areas of application of biotechnology. Organization and chemical composition of the cell. Organisms of biotechnological interest. Introduction to biomolecules (carbohydrates, lipids, proteins and nucleic acids) and examples of biochemical or biotechnological interest. Enzymes. Genetic engineering.

**Specific objectives:**

- To get an overview of the different fields of application of biotechnology and the role an engineer can play.
- To understand the basic organization of living beings, especially those of biotechnological interest.
- To know the structure and function of the main types of biomolecules and learn that they can be used for technological purposes

**Related activities:**

Laboratory session

**Full-or-part-time:** 37h 30m

Theory classes: 12h

Laboratory classes: 1h 30m

Self study : 24h

### Upstream and downstream bioprocessing. Examples of different biotechnology industries/applications

**Description:**

Metabolism: types and regulation. Respiration and fermentation. Industrial culture of microorganisms. Media. Bioreactors. Enzyme technology. Recovery of products. Specific applications of the biotechnology in the food industry, pharmaceutical/medical industry, chemical industry, energy production and environmental biotechnology.

**Specific objectives:**

- To understand the metabolic diversity of the organisms used in biotechnology and how this knowledge can be used sometimes to increase their productivity.
- To learn the different types of industrial culture of microorganisms and its main goals.
- To know some of the main types of bioreactors and their differences compared to chemical reactors.
- To know the main steps required for the recovery of bioproducts and understand the main differences between bioseparation and chemical separation processes.
- To get acquainted with the main areas of application and industries involved with biotechnology.

**Related activities:**

Laboratory session

**Full-or-part-time:** 37h 30m

Theory classes: 12h

Laboratory classes: 1h 30m

Self study : 24h

## GRADING SYSTEM

Exam 1 (45%)

Exam 2 (45%)

Laboratory sessions (10%)

or

Final Exam (90%)

Laboratory sessions (10%)



## EXAMINATION RULES.

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Qualification will be based on a continuous evaluation system:

There will be 2 exams during the course each accounting for 45% of the final mark.

For the evaluation of the mandatory practical sessions, a written report will be required, which will account for the remaining 10% of the final mark.

To benefit from this continuous assessment system, it is mandatory to attend all the evaluation acts. Otherwise, or in case of failing the course, the student will have to attend a final exam.

Final exam: A final exam on the whole subject will be held for those who fail the course or do not follow the continuous assessment system. This exam will account for 90% of the final mark, the remaining 10% coming from the practical sessions mark. Keep in mind that lab sessions are mandatory.

There will be no reassessment exam.

## BIBLIOGRAPHY

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### Basic:

- Fitch, J. Patrick. An engineering introduction to biotechnology. ISBN 0819444979.
- Glazer, Alexander N; Nikaido, Hiroshi. Microbial biotechnology : fundamentals of applied microbiology. ISBN 9780521842105.
- Madigan, Michael T. [et al.]. Brock biology of microorganisms. 16th ed.. 2022.
- Nelson, D.L., Cox, M.M.. Lehninger Principles of Biochemistry. 8th ed. 2021.
- Ratledge, Colin; Kristiansen, B. Basic biotechnology. ISBN 0521549582.
- Smith, John E. Biotechnology. ISBN 9780521711937.
- Waites, Michael J.; Morgan, Neil L.; Rockey, John S.; Higton, Gar. Industrial microbiology : an introduction. 2011. ISBN 0632053070.

## RESOURCES

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### Other resources:

Classroom material available at ATENEA