Course guide
295585 - 295PB014 - Biotechnological Processes

Last modified: 04/06/2026

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: 2026 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: NURIA SAPERAS PLANA

Others: Primer quadrimestre:
NURIA SAPERAS PLANA - Grup: T11, Grup: T12

REQUIREMENTS

A lab coat is required for the laboratory sessions.

LEARNING RESULTS

Knowledges:
K3. Identify the fundamentals of the processes of synthesis, manufacture, modification, use, recycling and degradation of polymers and biopolymers.
K1. Identify the molecular chemical structure of polymers and biopolymers.
K5. Relate the structure and properties of polymers and biopolymers in order to predict their behaviour and to obtain materials with new functionalities.

Skills:
S5. Select polymers and biopolymers according to their properties and intended use.

Competences:
C3. Apply acquired knowledge and problem-solving skills both in discipline-specific environments and in new or unfamiliar environments in broader (or multidisciplinary) contexts related to the field of study.
C2. Apply appropriate methods of analysis, production and management in the field of polymers and biopolymers.
C4. Make effective use of information resources, managing the acquisition, structuring, analysis and visualisation of data and information within the field of specialisation and critically evaluating the results of this process.

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
Self study	48,0	64.00
Hours small group	3,0	4.00
Hours large group	24,0	32.00

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

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

Exam 1 (45%)
Exam 2 (45%)
Laboratory sessions (10%)
or
Final Exam (90%)
Laboratory sessions (10%)

EXAMINATION RULES.

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.

There will be no reassessment exam.

BIBLIOGRAPHY

Basic:
- Fitch, J. Patrick. An Engineering introduction to biotechnology. Bellingham (Wash.): SPIE Press, cop. 2002. ISBN 0819444979.
- Glazer, Alexander N. ; Nikaido, Hiroshi. Microbial biotechnology : fundamentals of applied microbiology. 2nd ed. Cambridge: Cambridge University Press, cop. 2007. ISBN 9780521842105.
- Madigan, Michael T. Brock biology of microorganisms. 16th ed. Harlow: Pearson, 2022. ISBN 1-292-41236-4.
- Nelson, David L.; Cox, Michael M.; Hoskins, Aaron A.; Lehninger, Albert L. Lehninger principles of Biochemistry. Eight edition. New York: Macmillan Learning, [2021]. ISBN 9781319381493.
- Ratledge, C; Kristiansen, B (eds). Basic biotechnology. 3rd ed. Cambridge: Cambridge University Press, 2006. ISBN 9780521549585.
- Smith, John E. Biotechnology. 5th ed. Cambridge [etc.]: University Press, 2009. ISBN 9780521711937.
- Waites, Michael J.; Morgan, Neil L.; Rockey, John S.; Higton, Gar. Industrial microbiology : an introduction. Oxford: Blackwell Science, 2001. ISBN 0632053070.

RESOURCES

Other resources:
Classroom material available at ATENEA