

Course guide

240376 - 240IQU12 - Biotechnology and Environment

Last modified: 16/05/2023

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

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: Juan Jesus Perez Gonzalez

Others: Francesc Corcho

PRIOR SKILLS

Basic knowledge of organic chemistry

TEACHING METHODOLOGY

On-line lectures combined with in-person focused seminars.

LEARNING OBJECTIVES OF THE SUBJECT

The goal of the course is to provide specific basic skills in biotechnology with an emphasis on its application to environmental problems. From basic knowledge of biology and chemistry, the student will get a general view of biotechnological processes and their potential. However, the student will acquire specific tools to be able to design industrial processes in an environmental way through the use of biotechnology.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	24.00
Hours small group	13,5	12.00
Self study	72,0	64.00

Total learning time: 112.5 h



CONTENTS

Scope of Biotechnology

Description:

This first chapter aims to give a broad view of the world of biotechnology and its applications.

Specific objectives:

Microorganisms as reactors. Biomass production. Fermentation products. Recombinant DNA techniques.

Related activities:

Reading of texts associated with the technological revolution that represents biotechnology and predictions of the future.

Full-or-part-time: 9h 30m

Theory classes: 3h

Guided activities: 4h 30m

Self study : 2h

Biomass Production

Description:

This chapter explains methods for culturing cells and their industrial application.

Specific objectives:

The cell. Cell growth. Types of microorganisms.

Related activities:

Lectures. Seminar on the use of biomass in the food industry.

Full-or-part-time: 4h

Theory classes: 1h 30m

Guided activities: 1h 30m

Self study : 1h

Fermentations

Description:

The metabolic process of microorganisms and the production of metabolites will be studied.

Specific objectives:

Cellular metabolism. Fermentation control parameters. Applications to industry.

Related activities:

Lectures. Specific seminar on fermentations in the food industry.

Full-or-part-time: 8h 30m

Theory classes: 4h 30m

Guided activities: 3h

Self study : 1h

wastewater treatment

Description:

The wastewater treatment process will be studied as an application of the fermentation process.

Specific objectives:

Wastewater analysis. Organic matter content of wastewater. Treatment planning. Residual products.

Related activities:

Seminars

Full-or-part-time: 5h 30m

Guided activities: 4h 30m

Self study : 1h

DNA recombinant technologi

Description:

This chapter will present recombinant DNA technology and its application in the production of recombinant proteins.

Specific objectives:

Protein cell production machinery. Recombinant DNA technique. Recombinant proteins.

Related activities:

Lectures. Seminar on recombinant proteins for industrial use.

Full-or-part-time: 12h

Theory classes: 6h

Guided activities: 5h

Self study : 1h

Urban Waste Treatment

Description:

The aim is to provide knowledge about the production of biogas as a fermentation process.

Specific objectives:

Anaerobic fermentation processes. Industrial production of biogas from organic waste.

Related activities:

seminars

Full-or-part-time: 5h 30m

Guided activities: 4h 30m

Self study : 1h

GRADING SYSTEM

Continuous evaluation of homework (50%)+ final exam (50%). The mark of the re-take exam, if applicable, replaces the grade of the final exam.

EXAMINATION RULES.

Final exam can be done with classroom notes.



BIBLIOGRAPHY

Basic:

- Smith, John E. Biotechnology. 5th ed. Cambridge: Cambridge University Press, 2009. ISBN 9780521711937.