Universitat de Lleida

DEGREE CURRICULUM

BIOREACTORS

Coordination: GARVIN ARNES, ALFONSO

Academic year 2022-23

BIOREACTORS 2022-23

Subject's general information

Subject name	BIOREACTORS
Code	101620
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Bachelor's Degree in Biotechnology	3	COMPULSORY	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRAULA	TEORIA
Number of credits	2.1	3.9
Number of groups	2	1

Coordination	GARVIN ARNES, ALFONSO
Department	FOOD TECHNOLOGY, ENGINEERING AND SCIENCE
Teaching load distribution between lectures and independent student work	Contact hours: 60 Non-contact hours: 90
Important information on data processing	Consult this link for more information.
Language	Catalan: 80 Castilian: 20

BIOREACTORS 2022-23

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GARVIN ARNES, ALFONSO	alfonso.garvin@udl.cat	8,1	

Subject's extra information

Subject/matter in the overall curriculum

A great number of biotechnological processes have one or more steps of chemical reactions. Studying the chemical reactions allow to deepen in the bio-reactors design. From a technological point of view, enzymatic and microbial reactions are specially important. It is important to know the reaction rate concept and to use chemical kinetics to study not only the ideal bio-reactos but also the real reactors with a non-ideal flow.

Requirements for the subject

Pre-requirements: NO

Co-requirements: NO

Learning objectives

The student, after passing the subject, should be able to:

- Know all the ideal bio-reactors.
- Know the reaction rate concept and the different types of kinetic equations.
- Know how to get and solve the mathematical model of ideal bio-reactors, using the approach of mass and energy balances for any kinetic equation.
- Know how to use any kinetic equation in multiphase reactors.
- Know enzymatic and microbial reactions and how to obtain and solve the mathematical model in a bio-reactor.
- Know how to use immobilized bio-catalyst.
- Know the most important non-conventional bio-reactors.
- Know how to obtain the flow model in a real reactor and its difference from ideal reactors (stirred tank and plug flow).
- Know how to use the flow model for a real reactor to obtain the conversion, average time and useful volume. Know how to justify the deviation from the ideality.

Competences

General skills

GC1 Being able to selectively search for and use sources of information necessary to achieve the training objectives.

GC2 Interpret scientific-technical information with a critical sense, and be able to make presentations based on this information.

GC3 Working in a team, with a multidisciplinary vision and with the ability to make a rational and efficient distribution of tasks among team members.

GC4 Knowing and adequately using the scientific and technical vocabulary of the different areas of Biotechnology.

GC6 Knowing and knowing how to use the specific software and databases in the different fields of biotechnology.

GC7 Using the scientific method to analyze data and design experimental strategies with biotechnological applications.

GC8 Being able to form a critical judgment on the ethical, legal and environmental implications of biotechnology.

GC9 Being able to carry out a professional activity in accordance with safety regulations and respect for the environment and with ethical criteria.

GC10 Transmitting strategies and technological applications to the company, based on the general foundations of business economics.

GC12 Developing work skills and interpersonal relations in a work environment and knowing the organization and structure of a company or institution.

Specific skills

CE2 To know and understand the chemical fundamentals of biotechnological processes.

CE4 To know the principles of physical chemistry and being able to solve problems related to the kinetics of chemical reactions.

CE5 To know the basic principles of chemical engineering.

CE9 Achieve a satisfactory command of concepts and procedures related to integral differential calculus and linear algebra.

CE10 Be able to apply mathematical procedures to scientific-technical situations necessary throughout the studies and in the future exercise of the profession.

CE11 To know how to use the basic concepts of the statistical method, being able to statistically analyze the results of studies and interpret them critically.

CE13 To know and understand the physical-mathematical foundations of biotechnological processes.

CE29 To know the design of bioreactors for the development of specific production processes.

CE30 To know the technological processes based on the use of living beings and their optimization strategies.

CE31 Be able to calculate, interpret and rationalize bioindustrial processes based on the relevant parameters in transport phenomena and thermodynamic balances.

Subject contents

This subject is not taught in English. Please, check the available information in Catalan or Spanish. In case you need information in English, please contact the teaching staff of the subject.

Methodology

This subject is not taught in English. Please, check the available information in Catalan or Spanish. In case you need information in English, please contact the teaching staff of the subject.

Development plan

This subject is not taught in English. Please, check the available information in Catalan or Spanish. In case you need information in English, please contact the teaching staff of the subject.

Evaluation

This subject is not taught in English. Please, check the available information in Catalan or Spanish. In case you need information in English, please contact the teaching staff of the subject.

Bibliography

Basic bibliography

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Further Bibliography

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Blanc HW; Clark DS. 1996. *Biochemical Engineering*. Ed. Marcel Dekker, New York

Lee JM. 1991. *Biochemical Engineering*. Ed. Prentice Hall

Van't Riet, Tramper J. 1991. *Basic Bioreactor design*. Ed. Marcel Dekker, New York