

Course Unit	Biofactories, Bioproducts and Innovation	Field of study	Biology and biochemistry
Master in	Biotechnological Engineering	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	2
Level	2-1	ECTS credits	4.0
Code	5010-784-1201-00-23		
Workload (hours)	108	Contact hours	T - TP - PL - TC - S - E - OT - O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Anabela Rodrigues Lourenço Martins, Rui Miguel Vaz de Abreu

#### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:  
Having expertise in the culture in vitro industrial / pharmacological , develop methods for plants / algae / fungi and cel. animals bio-producers . Be able to develop Research and D & I projects

#### Prerequisites

Before the course unit the learner is expected to be able to:  
have knowledge of biology, physiology, in vitro culture and chemistry of natural products.

#### Course contents

Defining biofactory: vegetable, animal or microbiological. Biotransformation of different cell cultures. Industrial bioproducts. Biomass and secondary metabolites of plant and fungal origin. Biofactories with algae in bioremediation. Culture of cells / tissues in bioreactors. Commercial applications / biotechnology of natural compounds in pharmacology, food industry phytochemicals. New product development. Types of innovation. Management Research. Regulations. Innovation Protection

#### Course contents (extended version)

1. Defining a biofactory
  - of plant origin
  - animal origin
  - microbiological origin
2. Biotransformation of metabolites by cell cultures from different sources
  - vegetable, animal or microbiological
3. Production of industrial bioproducts, such as bioplastics, ethanol etc . .
4. Immobilization of cells, plants or other
5. Production of biomass and secondary metabolites of plant and fungal origin
6. Biofactories used in bioremediation originating from algae.
7. Cultivation of different types of cells or tissues in bioreactors
8. Commercial applications of biotechnology and natural compounds
  - pharmacology
  - food industry,
  - phytochemicals or other
9. Development of the concept of new product.
10. Types of innovation
  - Product Innovation
  - Process Innovation
  - Organizational innovation
  - Innovation Marketing.
11. Management of Research, Development and Innovation (RDI). Regulations NP 4456 and NP 4458 2007.
12. Innovation Protection
  - Intellectual Property and Industrial Property
  - Patents / Utility Models; Industrial Design and Model
  - Brand and Trade Name.

#### Recommended reading

1. Becker E. W. (2008) Microalgae: Biotechnology and Microbiology. Cambridge University Press
2. Neumann K. -H. , Kumar A. , Imani J. (2010) Plant Cell and Tissue Culture-A Tool in Biotechnology: Basics and Application, Springer
3. Rani K. (2012) Production of secondary metabolites: Production of antibiotics, amino acids, enzymes and use of microbes as bio-factories. LAP LAMBERT Academic Publishing
4. <http://www.marcasepatentes.pt/>
5. NP 4458 (2007) Gestão da Investigação, Desenvolvimento e Inovação (IDI), Requisitos de um projecto de IDI

#### Teaching and learning methods

Theoretical - Practical classes: Written work /projects and discussions of different points of views on the matter Outputs and study visits within the commercial biotechnology applications.

#### Assessment methods

1. Monography (25%) - (Regular) (Final, Supplementary, Special)
2. Final examination (25%) - (Regular) (Final, Supplementary, Special)
3. Seminars or workshops 25%) - (Regular) (Final, Supplementary, Special)
4. Reports of practicals or visits (25%) - (Regular) (Final, Supplementary, Special)
5. Monography (50%) - (Student Worker) (Final, Supplementary, Special)
6. Exam (50%) - (Student Worker) (Final, Supplementary, Special)

#### Language of instruction

1. English

## Language of instruction

2. Portuguese

## Electronic validation

Anabela Rodrigues Lourenço Martins, Rui Miguel Vaz de Abreu	Maria Letícia Miranda Fernandes Estevinho	Rui Miguel Vaz de Abreu	Paula Cristina Azevedo Rodrigues
18-01-2024	18-01-2024	23-01-2024	25-01-2024