

Course Unit	New Therapeutic Systems	Field of study	-
Bachelor in	Pharmacy	School	School of Health
Academic Year	2023/2024	Year of study	3
Type	Semestral	Semester	1
Level	1-3	ECTS credits	4.0
Code	9549-803-3106-00-23		
Workload (hours)	108	Contact hours	T - TP 45 PL - TC - S - E - OT 7,5 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) Luis Migue Fernandes Nascimento, Tiane Cristine Finimundy

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Mastering the basics of biotechnology and its interest in production Drug;
2. Understand the techniques and methods used in pharmaceutical production by biotechnology;
3. Understand the benefits that may or may not arise from the use of drugs obtained through biotechnology;
4. Identify the drugs that are currently obtained by the industry biotechnology;
5. Lead students to reflect on the prospects, challenges and future biotechnology applications in health care.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Not applicable.

### Course contents

Concept and Biotechnology application, biocatalysts, microbial biotechnology, industrial processes related to the area, sterilization. The biotechnology and health and biopharmaceuticals.

### Course contents (extended version)

1. INTRODUCTION
  - Definitions, concepts and objectives
  - Historical development of biotechnology
  - Interconnection of Biotechnology with various disciplines
  - Areas of Application of Biotechnology
2. BIOCATALYSTS
  - Types of biocatalysts
  - Immobilized biocatalysts / free
  - Preparation of Biocatalysts
  - Criteria for Selection of biocatalysts
  - Advantages of Biocatalysts for Chemical Catalysts
  - Biocatalysts of biological importance and its applications
3. MICROBIAL BIOTECHNOLOGY
  - Microbial Diversity and systematic
  - Isolation of Micro organisms
  - Composition of the microbial cells
  - Culture media
  - Development of inoculums
  - Types of Cultures
  - Phases of Growth
  - Kinetics of Microbial Growth - General
  - Kinetics of Microbial Growth in Discontinuous ("Batch")
  - Kinetics of Microbial Growth in Continuous
4. INDUSTRIAL PROCESSES IN BIOTECHNOLOGY
  - Bioreactors
  - Fermentation
  - Use of isolated enzymes as biocatalysts
  - Biotransformation
5. STERILIZATION
  - Death kinetics of vegetative cells
  - Death kinetics of spores
  - Decimal reduction time
  - Sterilization versus degradation of nutrients
  - Relative resistance to moist heat
  - Choose the time / temperature sterilization
  - Factor or Del Nabra
  - Stages and processes of sterilization of fermented
6. RECOVERY AND PURIFICATION OF PRODUCTS
  - Operations used
  - Factors that influence the choice of process
  - Income
7. BIOTECHNOLOGY AND HEALTH NEW THERAPEUTIC SYSTEMS
  - Gene therapy and new vaccines
  - Systems for controlled release of drugs
  - Biomaterials
  - Pharmaceutical Administration
  - Delivery of biopharmaceutical products. New drug delivery technologies.
8. BIOPHARMACEUTICALS
  - Genetic engineering
  - Recombinant DNA Technology
  - Alternatives to recombinant DNA technology
  - Advantages of biopharmaceuticals
  - Handling and storage of biopharmaceuticals
  - Regulation of biopharmaceuticals
  - Examples of biopharmaceuticals
  - Biosimilar pharmaceuticals
9. SAFETY AND REGULATION IN BIOTECHNOLOGY
10. ETHICS IN BIOTECHNOLOGY

**Recommended reading**

1. Walsh, G. (2003). Biopharmaceuticals: biochemistry and biotechnology. Chichester, Wiley.
2. Lima N. (2006), Biotecnologia, Fundamentos e Aplicações. Lisboa, LIDEL.
3. Ahuja, S. (1992). Chromatography of Pharmaceuticals: Natural, Synthetic, and Recombinant Products. Washington, American Chemical Society.
4. Oréfice, R. L. , de Magalhães Pereira, M. , & Mansur, H. S. (2006). Biomateriais: fundamentos e aplicações. Rio de Janeiro, Cultura Médica.
5. Rehm , H. J. ; Reed , G. ; Nagodawithana , T. W. (2000). Biotechnology. VCH

**Teaching and learning methods**

Theoretical-Practical Learning: Expositive method

**Assessment methods**

1. Alternative 1 - (Regular, Student Worker) (Final)
  - Final Written Exam - 80% (Minimum grade of 8, 5 values as Pedagogical Regulation of ESSa)
  - Development Topics - 20% (Minimum grade of 8, 5 values as Pedagogical Regulation of ESSa)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 80% (Minimum grade of 8, 5 values as Pedagogical Regulation of ESSa)
  - Development Topics - 20% (Minimum grade of 8, 5 values as Pedagogical Regulation of ESSa)
3. Alternative 3 - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100%

**Language of instruction**

1. Portuguese
2. Portuguese, with additional English support for foreign students.

**Electronic validation**

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06-11-2023	15-11-2023	08-02-2024	08-02-2024