

Course Unit	Alternative sources of natural products	Field of study	Life Sciences
Master in	Natural Products and Bioprospecting	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	2
Level	2-1	ECTS credits	6.0
Code	5012-740-1204-00-23		
Workload (hours)	162	Contact hours	T 30 TP - PL 30 TC - S - E - OT 4 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) Ana Maria Antão Gerales, Maria João Almeida Coelho Sousa

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
Know what a natural product is, and biological concepts. Know new sources (organisms, productions and compounds) of biological compounds for industries: Pharmaceuticals, cosmetics, food.

Prerequisites

Before the course unit the learner is expected to be able to:
knowledge of biology, physiology, natural products chemistry and biochemistry

Course contents

Natural Product Concept. Origin of new sources of compounds applicable in areas/industries: Pharmaceuticals, cosmetics, food. Know/Apply basic concepts of ethnopharmacology. Know databases of organisms/compounds with bioactivity. Bioactive potentials/characteristics. Example of successful application of bioproducts from different sources. technology/methodology of extracts, collection, culture/determination of bioactives. Green technology. Production and processing of bioactives

Course contents (extended version)

- The Natural Product Concept
 - Complete organism, which has only been exposed to preservation treatment, eg drying
 - Part of an organism (eg an isolated animal organ, flowers or leaves of a plant)
 - Part of an organism, exudates and an organism extract
 - Pure compounds from microorganisms, animals or fungi.
- Which are, where to find new sources applicable in areas/industries Pharmaceuticals, cosmetics, food
- Know and apply basic concepts of ethnopharmacology
- Use international, public/commercial databases of organisms/compounds with bioactivity
- Analyze/assess potential/bioactive characteristics of different sources and compounds
 - Prokaryote -bacteria and archaea
 - Eukaryotes: Protists
 - Fungi - micro and macrofungi
 - Animals – vertebrates and invertebrates; terrestrial and marine
- Animals – vertebrates and invertebrates; terrestrial and marine
 - macroalgae: feed/food fertilizers, biofuels/energy, pharmaceuticals, cosmetics
 - microalgae: pharmaceuticals, cosmetics, nutraceuticals. Amino acids, PUFAs, Vitamins, minerals, pigments
 - Algae: productions in cosmetics. Polysaccharides and dietary fibers, soluble/insoluble, hydrocolloids
 - Fungi: used to produce enzymes and small molecule compounds, antibiotics, organic acids
 - Filamentous fungi are used in the production of sustainable materials instead of plastics
 - Land animals: production of pharmaceuticals and cosmetics
 - Marine animals: collagen production, anti-tumor compounds, analgesics, etc.
- technology/methodology of extracts/methods development: collection, culture, identification
 - Green technology for processing animals, algae, microorganisms, fungi and marine organisms.
 - Innovative alternative extraction technologies
 - supercritical fluid extraction (SFE)
 - ultrasound assisted extraction (UAE)
 - pulsed electric fields (PEF) or microwave assisted extraction (MAE)
- Production technology (fungi, algae, marine organisms) packaging/processing

Recommended reading

- David E. Golan, Armen H. Tashjian, Ehrin J. Armstrong, April W. Armstrong, PRINCIPLES OF PHARMACOLOGY –The Pathophysiologic Basis of Drug Therapy, 2nd edition, Lippincott Williams & Wilkins, April 2007
- Han A BWösten (2019), Filamentous fungi for the production of enzymes, chemicals and materials. Current Opinion in Biotechnology, Volume 59, October 2019, Pages 65-70
- A. Mayer et al. Marine Pharmacology Marine Compounds with Antibacterial, Antidiabetic, Antifungal, Anti-Inflammatory, Antiparasitic, Antituberculosis, Antiviral, Anthelmintic Activities. Mar. Drugs 2020, 18(1), 5
- Ozcan Konur, HANDBOOK OF ALGAL SCIENCE, TECHNOLOGY AND MEDICINE, 1st Edition (2020) Academic Press
- Tharwat F. Tadros, PHARMACEUTICAL, COSMETIC AND PERSONAL CARE FORMULATIONS, IN FORMULATION SCIENCE AND TECHNOLOGY, De Gruyter, 2018

Teaching and learning methods

Theoretical Classes: Exhibition of theoretical content using audiovisual, with availability of material on the e-learning platform. Laboratory Practical Classes: Realization of experimental laboratory and field protocols. Development of protocols and seminars by students in groups and individually.

Assessment methods

- final exam - (Regular) (Final, Supplementary, Special)
 - Intermediate Written Test - 50% (theoretical assessment in each module. Minimum passing grade of 9.5)
 - Laboratory Work - 40% (Practical component of all Assessment Modules with eliminatory character, minimum grade 9,5)
 - Projects - 10% (development of innovative protocols and practical topics by students, in groups, or individually)
- theoretical and practical component - (Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 50% (theoretical assessment in each module. Minimum passing grade of 9.5)
 - Final Written Exam - 50% (Practical component of all Assessment Modules with eliminatory character, minimum grade 9,5)

Language of instruction

1. Portuguese
2. English

Electronic validation

Ana Maria Antão Gerales, Maria João Almeida Coelho Sousa	Paula Cristina Santos Baptista	Maria João Almeida Coelho Sousa	Paula Cristina Azevedo Rodrigues
16-01-2024	18-01-2024	18-01-2024	18-01-2024