

Course Unit	Pharmacology of natural products		Field of study	Pharmaceutical Sciences	
Master in	Natural Products and Bioprospecting		School	School of Agriculture	
Academic Year	2022/2023	Year of study	1	Level	2-1
Type	Semestral	Semester	1	ECTS credits	6.0
Workload (hours)		162	Contact hours	T 30   TP 30   PL -   TC -   S -   E -   OT 4   O -	
Code 5012-740-1102-00-22					

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) Carina de Fatima Rodrigues, Eugenia Conceicao Morais dos Santos Baptista, Olívia Rodrigues Pereira

### Learning outcomes and competences

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

1. Knowing the basic concepts of pharmacology
2. Understanding pharmacokinetics and Pharmacodynamics mechanisms; Identify factors that influence the body's response to certain natural drug compounds.
3. Consult and select sources of information concerning drugs and natural products and identify the groups of natural compounds with pharmacological effects
4. Understand the mechanisms of pharmacological action of different groups of compounds with an interest in pharmacology
5. Apply the concepts of interaction, toxicity and safety
6. Understand concepts of pharmacogenomics and pharmacogenetics and other "omics" and know the main genes responsible for the variation observed in the response to drug metabolism.
7. Understand the importance of gene variants and their impact on the pharmacokinetics and pharmacodynamics of natural products.
8. Identify laboratory techniques and protocols applied in Pharmacogenomics in individualized therapy and clinical trials.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Understand notions and mechanisms of anatomohistofisiology and biochemistry.

### Course contents

1. Basic Pharmacology; 2. Pharmacology of Natural Products; 3- Pharmacogenetics and Pharmacogenomics.

### Course contents (extended version)

1. Concepts of Pharmacology
  - Pharmacokinetics. Cycle of drugs in the body. Absorption. Distribution. Metabolization. Elimination
  - Pharmacodynamics. Notion of receptor and drug / receptor interaction. Agonists and antagonists
2. Drug-food-natural product compounds interactions.
3. Toxicity and safety
4. Models used for drugs obtained from natural products
5. Mechanisms, pharmacological actions and effects of groups of natural products compounds
  - Compounds with antimicrobial action
  - Compounds acting on the Central Nervous System
  - Compounds acting on the peripheral nervous system
  - Compounds with action on the Respiratory System
  - Compounds with action on the Digestive System
  - Compounds with action on the Cardiovascular System
  - Compounds with action in the Blood
  - Compounds with action on the endocrine system
  - Compounds with action on the musculoskeletal system
  - Compounds with action on the Skin
6. Pharmacogenomics and Pharmacogenetics: concepts
7. Genetic basis of drug response (enzymes, transport proteins and receptors)
8. Genetic polymorphisms that lead to interindividual variability in drug response
  - SNPs and other variants: available genotyping methods.
9. Pharmacogenetics/pharmacogenomics of natural products: towards personalized medicine
10. Pharmacogenomics in the development of new therapeutic agents
11. Laboratory techniques and protocols of genetics and genomics

### Recommended reading

1. Page, Curtis, Sutter, Walter, Hoffman. "Farmacologia integrada" 2ª Edição 2004. Editora Manole.
2. Goodman e Guilman, Alfred. "As bases farmacológicas da terapêutica". 10ª Edição 2003. Mac GrawHill, Brasil.
3. Heinrich, M., Barnes, J., Gibbons, S., Williamson, E.M. Fundamentals of Pharmacognosy and Phytotherapy. 2006. Churchill Livingstone
4. Cunha, A. P. . Plantas e produtos vegetais em fitoterapia. (2006), Fundação Calouste Gulbenkian
5. <https://www.futuremedicine.com/journal/pgs> ; <https://www.mdpi.com/journal/genes> ; <https://www.mdpi.com/journal/jpm>; <https://www.futuremedicine.com/loi/pme>

### Teaching and learning methods

Active methodologies with clinical and practical situations.  
Analysis and presentation of scientific articles related to UC content.

### Assessment methods

1. Continuous evaluation - (Regular, Student Worker) (Final, Supplementary, Special)
  - Intermediate Written Test - 65%
  - Work Discussion - 35%
2. Final exam - (Regular, Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100% (The grade is obtained through a final exam)

### Language of instruction

Portuguese, with additional English support for foreign students.

## Electronic validation

Carina de Fatima Rodrigues, Eugenia Conceicao Morais dos Santos Baptista, Olivia Rodrigues Pereira	Clementina Maria Moreira dos Santos	Maria João Almeida Coelho Sousa	Ana Maria Nunes Português Galvão
14-03-2023	14-03-2023	17-03-2023	19-03-2023