

Course Unit	Plant Physiology		Field of study	Biology and biochemistry	
Bachelor in	Biology and Biotechnology		School	School of Agriculture	
Academic Year	2023/2024	Year of study	2	Level	1-2
Type	Semestral	Semester	1	ECTS credits	6.0
Workload (hours)		162	Contact hours	T -    TP -    PL -    TC -    S -    E -    OT -    O -	
Code: 9029-782-2103-00-23					

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

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:  
Be acquainted with biochemical and physiological processes in plants. Understand water, nutritional and energy relations as well as plant growth and development, response to stresses.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Have Previous knowledge on Biology, Biochemistry , Chemistry and Physics

### Course contents

1. Water relations 2. Transpiration 3. Nutrition 4. Photosynthesis 5. Photorespiration 6. Plant Growth and development 7. Plant Ecophysiology 8. Plant secondary metabolism 9. Plant response to stresses.

### Course contents (extended version)

1. Water in plants. Main biological functions. Diffusion, mass flow and osmosis.
2. Water potential. Soil-plant-atmosphere system. Water absorption by the plant. Water in xylem.
3. Transpiration. Stomata physiology. Environmental /physiological control of stomata functioning.
4. Physiological/ environmental factors influencing transpiration. Photosynthesis/transpiration ratio
5. Nutrition. Essential mineral elements. Macronutrients and micronutrients. Functions and deficiency.
6. Transport in phloem: structure and transport mechanisms.
7. Photosynthesis. Structure of Photosynthetic system. Regulation of Photosynthetic Process.
8. Plants C3, C4, CAM. RubisCO: Structure and regulation. Photorespiration.
9. Factors affecting photosynthesis : Light, Temperature, CO2 and water availability.
10. Shade/Sun plants. Responses of C3, C4 and CAM plants to light, temperature CO2 and to water amounts
11. Plant Growth and development.
12. Phytohormones: Physiological role. How environment influences phytohormones action.
13. Biological and physiological functions of the plant phytochrome
14. Plant Secondary metabolites: characteristics and functions
15. Physiological stress. Structural and functional mechanisms of plant response to stressors.

### Recommended reading

1. AZCÓN-BIETO, J. & TALÓN, M. (2ed. ) (2008): Fundamentos de Fisiología Vegetal. Interamericana-McGraw-Hill, Madrid.
2. JAIN, V K (2022) Fundamentals Of Plant Physiology (20th Edition) S. CHAND PUBLISHING
3. RAVEN PH, EVERT RFC & EICHHORN SE (2012). Biology of Plants. 8th ed. , W. H. Freeman and Company. New York
4. TAIZ, L; MURPHY, A. MOLLER IM E ZEIGER E (2021) Fundamentos de Fisiologia Vegetal Artmed Editora
5. TAIZ L & ZEIGER E (2014) Plant Physiology. 6th ed. Sinauer Associates /online version: <http://5e.plantphys.net/index.php>.

### Teaching and learning methods

Theoretical lectures with expositive methods, utilization of audio-visual resources. Laboratorial practical exercises

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
  - Presentations - 25%
  - Final Written Exam - 75% (The minimum grade for the written exam must be at least 8.5.)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100%

### Language of instruction

Portuguese

### Electronic validation

Ana Maria Antão Gerales	Maria João Almeida Coelho Sousa	Altino Branco Choupina	Paula Cristina Azevedo Rodrigues
21-01-2024	23-01-2024	24-01-2024	25-01-2024