

Course Unit	Ecology and Management of Inland waters	Field of study	Environment Protection
Bachelor in	Environmental Engineering	School	School of Agriculture
Academic Year	2022/2023	Year of study	2
Type	Semestral	Semester	2
Level	1-2	ECTS credits	6.0
Code	9099-309-2202-00-22		
Workload (hours)	162	Contact hours	T 30 TP - PL 30 TC - S - E - OT 20 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) Amilcar António Teiga Teixeira

### Learning outcomes and competences

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

1. Learning Outcomes (1): To know the typology of aquatic ecosystems and understand abiotic and biotic interactions;
2. Learning Outcomes (2): To use correct methodologies to the sampling and data treatment;
3. Learning Outcomes (3): To detect disturbance factors of aquatic environment and apply different monitoring tools;
4. Learning Outcomes (4): To acquire basic elements to the management of inland waters.
5. Competences (1): capacity to analyze aquatic ecosystems functioning;
6. Competences (2): knowledge to find and analyze different kind of information in order to provide the conservation, mitigation or rehabilitation of each specific aquatic system.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Knowledge about chemical (water characteristics), biological and ecological sciences.

### Course contents

Physical and chemical characterization of freshwater environment. Water quality. Aquatic communities: ecological characterization, sampling design and techniques used to measure the productivity; Functioning of aquatic ecosystems and disturbance events; Management of lotic and lentic ecosystems; Biological tools to detect and quantify; Mitigation and rehabilitation of disturbed systems.

### Course contents (extended version)

1. THEORETICAL PROGRAM
  - INTRODUCTION Limnology: Interrelation with other sciences. Inland water ecology and biogeography.
  - ABIOTIC CHARACTERIZATION: Physical, chemical and microbiological parameters. Legislation.
  - BIOTIC CHARACTERIZATION: bacteria and fungi; plants, invertebrates and fish.
  - LOTIC ECOSYSTEMS: hydrodynamics. structure and functioning. Riparian Ecotones. Productivity
  - LENTIC ECOSYSTEMS: stratification. Nutrient, O<sub>2</sub> and temperature balance. Trophic classification.
  - BIOMONITORING: bioindicator concept; ecological integrity and assessment metrics.
  - DISTURBANCE: natural and anthropic causes; resistance and resilience; recovery and rehabilitation
  - MANAGEMENT: monitoring and planning; habitat, population and ecosystem management. Legislation
2. PRACTICAL PROGRAM
  - Study Cases: Lotic and lentic ecosystems of the region. Field and laboratorial works.

### Recommended reading

1. Calow, P. & Petts, G. (1994). Rivers Handbook. Vol. I & II. Blackwell Science Publications. London.
2. Allan J.D., Castillo M., Capps K.A. (2021). Stream Ecology: Structure and Function of Running Waters. Springer. USA
3. Schreck, C. & Moyle, P. (1990). Methods for Fish Biology. American Fisheries Society. Bethesda.
4. Feio M.J. e Ferreira V. (2019). Rios de Portugal: comunidades, processos e alterações. Imprensa da Universidade de Coimbra. 442pp.
5. Wetzel, R. & Likens, G. (1991). Limnological Analyses. Springer-Verlag. New York.

### Teaching and learning methods

Lessons 1) Lectures: sessions will use audiovisual media resources. Laboratory classes - a) field work based on specific methodologies and material (e. g. electrofishing device). b) Laboratorial- identification, data treatment and analyses. 2) Tutorial – practical works started during lectures; Investigation and group works (seminar); library research (B-on).

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
  - Practical Work - 30%
  - Presentations - 12%
  - Intermediate Written Test - 29%
  - Final Written Exam - 29%
2. Alternative 2 - (Regular, Student Worker) (Supplementary)
  - Final Written Exam - 100%
3. Alternative 3 - (Regular, Student Worker) (Special)
  - Final Written Exam - 100%

### Language of instruction

Portuguese, with additional English support for foreign students.

### Electronic validation

Amilcar António Teiga Teixeira	José Paulo Mendes Guerra Marques Cortez	Artur Jorge de Jesus Gonçalves	Maria Sameiro Ferreira Patrício
05-12-2022	11-01-2023	24-02-2023	24-02-2023