

Course Unit	Applied Biology and Geology	Field of study	-		
Master in	Environmental Education	School	School of Education		
Academic Year	2023/2024	Year of study	1	Level	2-1
Type	Semestral	Semester	1	ECTS credits	9.0
Code	6083-766-1101-00-23				
Workload (hours)	243	Contact hours	T -	TP 54	PL -
			TC 9	S -	E -
			OT 27	O 90	

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) Paulo Miguel Mafra Gonçalves

### Learning outcomes and competences

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

1. Understand the interactions between Science, Technology, Society and Environment and discuss the functional implications of these interactions.
2. Recognize the role of microorganisms and their ecological importance.
3. Assess the impact of biotechnology on the environment, industry (food and pharmaceuticals), quality of life and ecosystems.
4. Discuss advantages and disadvantages of genetic manipulation of living beings in a social and ethical as well as the implications of these to the environment.
5. Recognize ways of combating watercourse contamination, air and soil pollution, etc.
6. Understanding the need for a balanced management of natural resources and the impact of humans on the environment.
7. Know examples of projects / investigations in the areas of Biology and Geology in order to solve identified problems and contribute to a more sustainable society.
8. Integrate the knowledge of complex issues in order to judge and propose solutions within the framework of Environmental Education.

### Prerequisites

Before the course unit the learner is expected to be able to:  
No pre-requisitos.

### Course contents

Science, Technology, Society and Environment - Mutual interactions; Biodiversity: Biodiversity and biotechnology; Biotechnology at the service of the community. Water quality problems: eutrophication and pollution; Environment and geology; Geodiversity and Geoconservation; Geological risks. Sustainable use of geological resources; Alternative energies and sustainable development; Activities, projects in Environmental Education considering Biology and Geology themes.

### Course contents (extended version)

1. Science, Technology, Society and Environment - Mutual interactions.
2. Biodiversity. Environmental importance of microorganisms
3. Biodiversity and biotechnology.
  - Biotechnology at the service of the community (food production, pest control, pollution, etc. ).
  - Genetically modified organisms (GMOs). Genetic engineering and genetic improvement.
  - Environmental biotechnology: advantages and disadvantages to the Man and environmental.
  - Examples of research and projects in the area of biotechnology (food, agriculture, etc. )
4. Problems of water quality: eutrophication and pollution.
  - Bioremediation and Fitoremediation.
5. Environment and geology.
  - Geology, environmental science.
  - Geodiversity and Geoconservation
  - Enhancement of geological heritage - geoparks
6. Geological risks.
  - Earthquakes; volcanoes; tsunamis; landslides; subsidies and floods, fall of meteorites.
7. Sustainable use of geological resources.
8. Human impacts on the environment. Contaminants in geological environment.
9. Activities, projects and teaching approaches in Environmental Education.

### Recommended reading

1. Deon, M. , De Rossi, A. et al. (2012). Biorremediação de solos contaminados com resíduos oleosos através de bioaugmentação e atenuação natural. Semina: Ciências Exatas e Tecnológicas, 33 (1) 73-82.
2. Freitas, M. (2005). Geologia e ambiente: recursos geológicos. Lisboa: Universidade Aberta.
3. Macedo, A. , Venâncio, A. , & Malcata, F. (2003). Biotecnologia dos Alimentos. Em N. Lima e M. Mota (Coord. ), Biotecnologia – Fundamentos e Aplicações. Lisboa: Lidel – Edições Técnicas, Ida.
4. Thompson, R. , & Turk, J. (2005). Earth Science and the Environment. Brooks/Cole
5. Videira, A. (2001). Engenharia Genética – Princípios e Aplicações. Lisboa: Lidel – Edições Técnicas, Ida.

### Teaching and learning methods

The course has a strong component reflective, interactive and practical. Some classes will have a theoretical character/illustrative, in which the presentation of content is done by the teacher with assistance from the students, but there will also be various activities (discussions, laboratory activities and activities of Ambient Education). Will be carried out work in field and study tours.

### Assessment methods

1. Continuous evaluation - (Regular, Student Worker) (Final)
  - Development Topics - 50% (Accomplishment of a Individual Work involving a practical part and presentation.)
  - Intermediate Written Test - 50% (Realization of a written test.)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 50% (The final exam will focus on only the theoretical component.)
  - Development Topics - 50% (Individual Work with practical component and presentation (frequency evaluation).)

### Language of instruction

Portuguese

## Electronic validation

Paulo Miguel Mafra Gonçalves	Adorinda Maria Rodrigues Pereira S. Gonçalves	Sofia Marisa Alves Bergano	Carlos Manuel Costa Teixeira
14-02-2024	14-02-2024	18-02-2024	18-02-2024