

Course Unit	Waste Valorisation Methods	Field of study	Environmental Protection Technologies
Master in	Environmental Technology	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	2
Level	2-1	ECTS credits	5.0
Code	1076-809-1204-00-23		
Workload (hours)	135	Contact hours	T - TP - PL - TC - S - E - OT - 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) Artur Jorge de Jesus Gonçalves

#### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:  
Understand the main waste management processes; Define strategies for the different waste categories finding adequate technical solutions.

#### Prerequisites

Before the course unit the learner is expected to be able to:  
Not applicable.

#### Course contents

1. Introduction. 2. Sustainable management. 3. Waste management systems. 4. Different Waste categories management. 5. Valorization of waste. 6. Solid Waste landfills.

#### Course contents (extended version)

1. Introduction.
  - Waste valorization concepts.
2. Sustainable waste management.
  - Waste recovery and waste hierarchy. Principle of the 3 R's (Recovery, Recycling and Reuse).
3. Waste management systems.
  - Undifferentiated and selective collection.
  - Circuits. Recycling containers and recycling centers.
  - Waste transfer stations.
4. Management ranks and specific waste streams:
  - Glass;
  - plastic, paper and cardboard;
  - metal;
  - wood;
  - waste electrical and electronic equipment
  - construction and demolition waste;
  - waste oils, tires, vehicles
5. Treatment and Waste Recovery:
  - Anaerobic digestion, biogas, cogeneration;
  - Heat treatment by incineration and pyrolysis. Bioethanol. Biodiesel.
  - Composting. Agronomic valorization of waste.
6. Deposition in landfill. implementation, construction, operation, monitoring.

#### Recommended reading

1. Carreira, L.; Cabeças, A. (2002) "Resíduos Sólidos Urbanos. Conceção, construção e exploração de tecnossistemas". Instituto dos Resíduos, 430 p.
2. Batista, J. ; Batista, E. (2007). "Compostagem. ". Universidade dos Açores.
3. Tchobanoglous, G. (1993) "Integrated Solid Waste Management: Engineering Principles and Management Issues." McGraw-Hill International Edition, New York.
4. Vesilind, P. A. ; W. Worrell; D. Reinhart (2002) "Solid Waste Engineering" Brook/Cole Thomson Learning; Pacific Grove, CA, USA, 428 p.
5. Williams. P. T. (1998) "Waste Treatment and Disposal", John Wiley & Sons, Chichester, West Sussex; England, 417 p.

#### Teaching and learning methods

Classes are Theoretical and Practical. Theoretical classes will be held in classrooms with video projection devises. Practical will be held in laboratories. Evaluation is based on homeworks (65%) and theoretical evaluations (35 %).

#### Assessment methods

1. Normal Student - (Regular) (Final, Supplementary)
  - Practical Work - 65% (Homeworks - Graded 10-20)
  - Final Written Exam - 35% (Theoretical examination - 8/10 minimum grade. Final = TP\*0, 65+FE\*0, 35 Aprovado: Final > 9, 49)
2. Work Student - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100%
3. Special Dates - (Regular, Student Worker) (Special)
  - Final Written Exam - 100%

#### Language of instruction

Portuguese

#### Electronic validation

Artur Jorge de Jesus Gonçalves	Margarida Maria Pereira Arrobas Rodrigues	Manuel Joaquim Sabença Feliciano	Maria Sameiro Ferreira Patrício
18-01-2024	22-01-2024	22-01-2024	22-01-2024