

Course Unit	se Unit Effluent and Waste Treatment			Field of study	Environmental protection technology	
Bachelor in	Food Engineering			School	School of Agriculture	
Academic Year	2022/2023	Year of study	3	Level	1-3	ECTS credits 6.0
Туре	Semestral	Semester	2	Code	9087-641-3205-00-22	
Workload (hours)	162	Contact hours	T - TP T - Lectures; TP - Lectures a	- PL - T nd problem-solving; PL - Problem-	C - S - solving, project or laboratory; TC -	E · OT · O · Fieldwork; S · Seminar; E · Placement; OT · Tutorial; O · Other

Name(s) of lecturer(s)

Amilcar António Teiga Teixeira, Maria Sameiro Ferreira Patrício

Learning outcomes and competences

- At the end of the course unit the learner is expected to be able to: 1. Know and plan the physical, chemical and biological unit processes used in the treatment and recovery of waste and effluents; 2. Understand the fundamentals of waste and effluent management resulting from the Food Industry;
- 3. Know the main legislative documents and standards related to waste and effluents

Prerequisites

Before the course unit the learner is expected to be able to: Basic knowledge on physics, chemistry, biology and mathematics

Course contents

1. Effluents and waste in the food sector. 2. Conventional effluent treatment methods. 3. Gaseous emissions and effluents. 4. Solid waste. 5. Food processing byproducts. 6. Legislation and environment management systems. 7. Case Studies in the food industry.

Course contents (extended version)

- 1. Effluents and waste in the food sector.
 - Characterization
- Key legislation
 Fundamentals of physico-chemical and biological processes used in effluents and waste treatment
 Conventional effluent treatment methods.
- Preliminary, primary, secondary and tertiary treatment
 Sludge treatment and disposal
 Gaseous emissions and effluents
- characterization
- treatment methods 4. Solid wastes.
 - Characterization
 - Collection and transport
 - Treatment, recycling, valuation and elimination
- Food processing byproducts.
 Legislation and economical aspects of effluents and waste management.
 Case Studies in the food industry.

Recommended reading

- Metcalf and Eddy (2014). Wastewater Engineering Treatment and Resource Recovery (5^a ed.), McGrawHill, Inc., New York.
 Galanakis, C. M. (2015). Food Waste Recovery: Processing Technologies and Industrial Techniques, Elsevier
 Waldron, Keith (2007). Handbook of waste management and coproduct recovery in food processing Vol. 1, Woodhead Publishing Limited, Cambridge.
 Kreith, F., Tchobanoglous G. (2002). Handbook of Solid Waste Management (2^aed), McGrawHill
 Heinesohn R. e Kabel R. (1999). Sources and control of air pollution. Prentice Hall.

Teaching and learning methods

Classes are divided in theoretical (T), practical (P) and Tutorial (OT). In theoretical classes subjects are presented. In Practical classes, students are assisted in developing on-class works and research activities. In tutorial classes, students receive further assistance in ongoing research activities.

Assessment methods

- Alternative 1 (Regular) (Final, Supplementary, Special)

 Final Written Exam 70%
 Practical Work 30% (2 (two) practical group works: one about solid waste and another about wastewater treatment.)

 Alternative 2 (Student Worker) (Final, Supplementary, Special)

 Final Written Exam 70%
- Practical Work 30% (2 (two) practical individual work or practical exam)

Language of instruction

Portuguese, with additional English support for foreign students

Electronic validation			
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05-12-2022	08-12-2022	08-12-2022	19-12-2022