Course Unit	Air Pollution Prevention and Control Technology			Field of study	Environmental Protection Technology		
Master in	Environmental Technology			School	School of Agriculture		
Academic Year	2022/2023	Year of study	1	Level	2-1	ECTS credits	6.0
Type	Semestral	Semester	2	Code	1076-409-1205-00-22		

Workload (hours)	162	Contact hours	T	TP	PL	TC	S	E	OT	O
			30	-	30	-	-	-	20	-

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): Manuel Joaquim Sabença Feliciano

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Use theoretical and practical knowledge on prevention, control and management of air pollutants and greenhouse gases emissions;
2. Identify the main origins of atmospheric pollutants in the various human activities;
3. Select technologies to reduce air pollutants emissions from stationary and mobile sources;
4. Know and understand technologies for capturing, transporting and storing carbon dioxide;
5. Design and improve performance of pollution control equipment.

Prerequisites

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

Course contents

1. Air pollutants and greenhouse gases emissions. 2. Physic-chemical characteristics of gaseous emissions. 3. Particulate matter control technologies. 4. Gaseous pollutants control technologies. 5. Carbon dioxide capture and storage technologies.

Course contents (extended version)

1. Air pollutants and Greenhouse gases emissions
   - air contaminants.
   - greenhouse gases.
   - stationary and mobile sources.
   - Prevention and control.
   - Legal framework.
2. Physico-chemical characteristics of air emissions
   - physical properties.
   - chemical properties.
   - fundamental laws of gases.
3. Methods of Particulate Collection
   - inertial systems: components; operation principle; design and performance; applications.
   - cyclones: components; operation principle; design and performance; applications.
   - wet scrubbers: components; operation principle; design and performance; applications.
   - electrostatics precipitators: components; operation principle; design and performance; applications.
   - fabric filters: components; operation principle; design and performance; applications.
4. Methods for Cleaning Gaseous Pollutants
   - adsorption systems: components; operation principle; design and performance; applications.
   - absorption systems: components; operation principle; design and performance; applications.
   - combustion systems: components; operation principle; design and performance; applications.
   - reduction systems: components; operation principle; design and performance; applications.
   - condensation systems: components; operation principle; design and performance; applications.
5. Carbon dioxide capture and storage technologies
   - methos for CO2 capture.
   - CO2 transportation.
   - CO2 storage.
   - CO2 reutilization.
   - constrictions, costs and environmental impacts.

Recommended reading

1. Boubel R. W. , Fox D. L. , Turner D. B. e Stern A. C. 1994. Fundamental of Air Pollution. 3ª Ed. , Academic Press, USA.
2. Gomes J. 2001. Poluição atmosférica: Um Manual Universitário. Publindústria. Edições Técnicas.
3. Heinesohn R. e Kabel R. 1999. Sources and control of air pollution. Prentice Hall.
4. Schifftner K. C. 2002. Air pollution control equipment selection guide. CRC Press LLC.
5. Licht, W. 1988. Air Pollution Control Engineering: Basic Calculations for Particulate Collection, 2nd ed. , Marcel Dekker Inc. , New York.

Teaching and learning methods

Conventional lectures with oral presentation of subjects. Labs based upon development of pratical exercises and technical and scientific field trips. In tutorial classes, students receive further assistance in ongoing research activities.

Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
   - Practical Work - 30%
   - Final Written Exam - 70%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Manuel Joaquim Sabença Feliciano	Luís de Sousa Costa	Manuel Joaquim Sabença Feliciano	Maria Sameiro Ferreira Patrício
16-12-2022	18-12-2022	19-12-2022	19-12-2022