INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Environmental Toxicology			Field of study	Environment Protection		
Bachelor in	Environmental Engineering			School	School of Agriculture		
Academic Year	2022/2023	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	1	Code	9099-309-2105-00-22		

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): Maria Eugénia Madureira Gouveia

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Understand the general toxicological concepts.
2. Learn the mechanisms of toxicity of xenobiotics.
3. Critical analysis of toxicological parameters and toxicological studies.
4. Know the appropriate methods and techniques for risk assessment in ecotoxicology.
5. Identify the major sources of environmental pollution from agricultural activities (pesticides) and learn technologies to reduce pollution.

Prerequisites

Before the course unit the learner is expected to be able to:
Students must have Knowledge in Biology

Course contents

Toxicological evaluation of xenobiotics (acute and chronic toxicity). Mechanisms of toxicity, absorption, toxicinética and biotransformation of xenobióticos. Toxicology versus ecotoxicology. Environmental behavior and bioavailability of chemicals. Biomarkers. Ecotoxicological parameters and techniques for risk assessment in aquatic and terrestrial environment. Monitoring and risk characterization in ecotoxicology. Environmental pollution and agriculture.

Course contents (extended version)

1. Fundamental concepts in toxicology.
2. Mechanisms of toxicity and target organs
3. Toxicokinetics (ADME)
   - Exposure, absorption, distribution and elimination of xenobiotics
   - Biotransformation of xenobiotics.
   - Reactions of phase I and phase II.
4. Toxicology vs ecotoxicology.
   - Behavior and bioavailability of chemicals.
   - Tests for ecotoxicologic evaluations
   - Biochemical markers, biochemical indicators and monitors
5. Risk Assessment for plant protection produts
   - Methods and steps in toxicological “Risk Assessment”
   - Risk management and risk comunication
6. Pesticide comercialization in Europe.
   - Preer review of plant protection produts
   - Positive list of active ingredientes in Europe
7. Main components of toxicological risk assessment of plant protection produts.
   - Health and environmental effets of pesticides
   - Pest Management and plant protection.

Recommended reading

1. Gerrit Schuumam & Bernd Markert 1997. Ecotoxicology, Ecological Fundamentals, Chemical exposure, and Biological Effets. Willey-Interscience Series.
2. Sigmund, F. & Zakrzewski, 1997. Principles of Environmental Toxicology. ACS Monograph 190. American Chemical Society
3. Honeycutt, R. C. & Day, Jr. , E. 2001. Worker Exposure to Agrochemicals. Methods for monitoring and assessment. CRC Press
4. Scientific "Opinions", Scientific and Technical "Reports" rand other resources recently published by AEE, EFSA, OCDE.

Teaching and learning methods

Lectures and practical laboratory protocols and field work in terrestrial and aquatic ecosystems. Bibliographic research on data bases and bibliography research for preparing seminars and experimental work.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Reports and Guides - 20%
   - Final Written Exam - 20%
   - Final Written Exam - 60%
2. Alternativa 2 - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese

Electronic validation

Maria Eugénia Madureira Gouveia	Maria da Conceição Constantino Fernandes	Artur Jorge de Jesus Gonçalves	José Carlos Batista Couto Barbosa
09-12-2022	09-12-2022	10-12-2022	10-12-2022