



Year 2 Semester 4 ISCED Code: 512 ECTS: 5,0

Type of Course Unit: Compulsory Delivery Mode: Face-to-face Language of Instruction: Portuguese

COURSE COORDINATOR: Patrícia Alexandra Dias Brito Palma

#### HOURS OF WORK

TOTAL HOURS	Contact Hours								Hours in autonomous work
	Theory	Theory and practice	Practical and laboratory work	Field work	Seminar	Internship	Tutorial guidance	Other	
125		30	30						65

Prerequisites (if applicable):

#### LEARNING OUTCOMES (knowledge, skills and competence)

The principal outcomes of the course include: (i) to develop skills in analysis and understanding of the mechanisms of toxicity of toxic agents, with high impact on clinical, occupational and forensic areas, namely solvents, metals, pesticides and drugs of abuse; (ii) to intend that the students get the ability to use the acquired knowledge in an integrated way to assess the toxicity of the compounds. Upon achievement the course the students must have acquired knowledge, skills and competencies that enable them to intervene in the evaluation of medico-legal and forensic processes, therapeutic monitoring of patients undergoing prolonged treatment, biological monitoring of occupational exposure to chemicals, anti-doping in competitions and in diagnosis of acute or chronic poisoning.

#### CONTENTS

1. GENERAL CONCEPTS OF TOXICOLOGY
2. ANALYTICAL TOXICOLOGY: sampling and conservation of samples, procedures for toxicological analysis. Main compounds involved in fatal poisonings. Interpretation of analytical results. Poisoning and its treatment (antidotes and measures to promote the elimination: diuresis, dialysis, hemoperfusion).
3. TOXIC AGENTS: (i) SOLVENTS AND VAPORS; (ii) METALS; (iii) PESTICIDES; (iv) ABUSE DRUGS: Properties, Main sources of pollution, toxicokinetics and toxicity, bioaccumulation and biomagnification type of poisoning; Chelating agents used in the treatment of intoxications.
4. TOXICITY ASSESSMENT OF COMPOUNDS IN A REGULATORY PERSPECTIVE:  
(i) Toxicity tests; (ii) Trials in humans; (iii) Epidemiological studies; (iv) Notion of Risk/ Benefit of chemicals (v) Evaluation of the acceptable daily intake; (vi) Extrapolation for man of toxicity assays results.

#### DEMONSTRATION OF THE CONTENTS COHERENCE WITH THE COURSE UNIT'S LEARNING OUTCOMES

Students should acquire skills on the main concepts of toxicology and factors influencing toxicity, in order to integrate knowledge and to have an overview of toxicological phenomena that can occur in living organisms, and interpret/ predict its deviations due to: (i) the characteristics inherent of the toxic themselves; (ii) the intrinsic variability of living organisms (tolerance susceptibility, immune status); and (iii) the variance of external factors. They should acquire knowledge of the sampling procedures and the various methods of detection of the toxic agents and biomarkers in biological fluids, food, air, water and soil, in order to diagnose or prevent poisonings. Thus, the theoretical and practical component integrates three main knowledge modules: (i) general bases of toxicology; (ii) Toxicology of the main chemical agents; (iii) analytical toxicology as an assessment tool in the context of other areas of toxicology.

## TEACHING METHODOLOGIES

The teaching methodology includes expository theory-practical classes with resolution of case-studies in order to understand the general concepts of analytical toxicology, together with application examples to Bioanalytical Sciences. Practical classes for the development of analysis methodologies of toxic substances (solvents, metals, drugs, abuse drugs and pesticides), in the various biological fluids and abiotic compartments, with the presentation and interpretation of results in the form of reports.

## DEMONSTRATION OF THE COHERENCE BETWEEN THE TEACHING METHODOLOGIES AND THE LEARNING OUTCOMES

The teaching methods include lectures to make use of a strategy of interpretive and interactive exhibition of the concepts in which students are involved and applied analysis of case-study. Practical lessons that use laboratory practice of development processes for the identification and quantitation of toxic substances. These types of lessons are consistent with the objectives of the course which aimed to enable students to understand, describe and relate knowledge about toxic substances, in particular toxicokinetics, mechanisms of action and adjustment, with the interpretation and assessment processes in the areas of forensic toxicology, clinical (in therapeutic monitoring), occupational (in biological monitoring of occupational exposure to chemicals) and anti-doping control.

## EVALUATION METHODS

The Theoretical evaluation is obtained by conducting a written test (70%); the evaluation practice is obtained by integrating reporting of results of the practical classes and by the development of a project in the area of environmental toxicology (30%). The student must be admitted to practice to get the theory test. Note the minimum allowable for each element of assessment is 10 values. The assessment of recovery is through a written test.

## MAIN BIBLIOGRAPHY

-Baird, C.; 1999. Environmental Chemistry. Eds. W. H. Freeman and Company, 2nd edition, New York.

Grau, M. D. M.; 2003. Toxicología Ambiental. Evaluación de riesgo para la salud humana. McGraw-Hill/ Interamericana de España, S. A. U.; 1th edition

Hallenbeck, W. H.; 2000. Quantitative Risk Assessment for Environmental and Occupational Health. Lewis Publishers, 2nd edition.

Klaassen, C. D.; 2001. Cassaret & Douglas Toxicology: The basic science of poisons. McGraw-Hill, 6th edition.

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