



Course Unit: 15731 – Soils and Sediment Quality Control

Year 3 Semester 5 ISCED Code: 712 ECTS: 6,0

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

COURSE COORDINATOR: Maria Adelaide Araújo Almeida

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	
150	30	45							75

Prerequisites (if applicable): Not applicable

LEARNING OUTCOMES (knowledge, skills and competence)

On successful completion of this course unit, the student should be able to:

- . Have knowledge on the different physical, chemical and biological parameters used to characterize soil quality.
- . To identify the different guidelines and legislation for the evaluation of soil and sediments quality.
- . Use, in a laboratorial context, different methods for the evaluation of soil and sediments quality, taking in consideration the legal and guideline values for those results.

CONTENTS

The soil: its constitution, functions and land uses. Soil properties and processes which affect their functions.

Identification of the most important parameters which can be used to evaluate soil properties. Causes of soil pollution and main types of soil pollutants: organic and inorganic. Physical parameters for the evaluation of soil quality and main methodologies used for their evaluation. Chemical parameters for the evaluation of soil quality and main methodologies used for their evaluation. Biological parameters for the evaluation of soil quality and main methodologies used for their evaluation. Processes of sediments formation, their transport and classification. Erosion. Agricultural sediment delivery to rivers. Estuary and marine sediments. Sediments composition, Main parameters used for sediments characterization and in their contamination evaluation. Legislation and guidelines for the evaluation of soil and sediments quality.

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

The syllabus helps to achieve the learning objectives once:

- It addresses the main concepts related to soil characteristics, its functions and uses.
- Identifies the main parameters used in the evaluation of soil quality, and the experimental methodologies used in their assessment:
 - * Physical parameters: texture, structure, density and bulk density, porosity, water holding capacity, infiltrability;
 - * Chemical parameters: pH, electrical conductivity, organic matter or organic carbon

content, cation exchange capacity, total nitrogen, available nutrients, P, K, Ca and Mg, elements or compost which are usually related to soil contamination, like heavy metals, nitrate and pesticides.

* Biological parameters, related with soil microorganism, their activities and related products (e.g. microbial biomass, nitrification potential, enzymatic activities).

- It addresses concepts related to sediments formation, their composition, transport, potential contamination.

TEACHING METHODOLOGIES

Expositive lectures, practical classes, laboratorial classes, guided study.

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

Learning in this unit will be based on lectures, practical and laboratory classes.

The lectures will consist of an expository session, which will serve to introduce the fundamental concepts associated with the syllabus. These classes will be followed by practical lessons, aiming the preparation for lab classes, in which students will carry out the resolution of exercises using concepts covered in lectures, they will be explained the methodologies used in laboratory classes, they will practice how to use legislation and quality standards for assessing the quality of soil and sediment quality.

Laboratory classes are mainly targeting the implementation of laboratory protocols for assessing soil and sediment quality. Experimental results will be analyzed and discussed.

The aim of these lab classes is mainly to provide a more practical view of theoretical concepts as well as instigating the initiative and participation of students.

The learning gained in these laboratory classes will be measured by the elaboration of Reports, one for each laboratory work. This methodology allows the evaluation of learning objectives throughout the process, requires greater interaction between students and teacher, allowing constant assessment by the teacher of the knowledge acquired by the student, allowing you to make the necessary adjustments

EVALUATION METHODS

Laboratorial/Practical evaluation (written reports with discussion of the results obtained in the laboratorial classes): 40%.

Theoretical examination (a final exam): 60%.

MAIN BIBLIOGRAPHY

Klute, A., (Ed.), (1996). *Methods of Soil Analysis. Part 1. Physical and Mineralogical Methods.*

Soil Science Society of America, Madison, Wisconsin.

Page, A.L., (Ed.), (1982). *Methods of Soil Analysis. Part 2. Chemical and Microbiological Properties.* 2nd Edition. Soil Science Society of America, Madison, Wisconsin. Bartels, J.M. (Ed.), (1996). *Methods of Soil Analysis. Part 3. Chemical Methods.* Soil Science Society of America, Madison, Wisconsin. Benton Jones, Jr., J.(Ed.) (1999). *Soil Analysis Handbook of Reference Methods.* CRC Press, p. 264. Doran, J.W. and T.B. Parkin. 1996. Quantitative indicators of soil quality: a minimum data set. In J.W. Doran and A.J. Jones, eds. *Methods for Assessing Soil Quality.* SSSA, Inc., Madison, Wisconsin, USA. Ohio Environmental Protection Agency (2010). *Guidance on Evaluating Sediment Contaminant Results.* Division of Surface Water, Standards and Technical Support Section, Consultado em: http://epa.ohio.gov/portals/35/guidance/sediment_evaluation_jan10

