**Code: 1767** **Soil Science and Plant Nutrition**
**Degree:** 1st cycle - Landscape Architecture; Environmental Engineering
**Curricular Year: 3rd** **Semester Course: 1st**
**Credits: 8.5 ECTS** **Compulsory**
**Language:** Portuguese/English
**Prerequisites:** Chemistry
**Responsible:** Ernesto José de Melo Pestana de Vasconcelos
**Other lecturer(s):** Amarilis Paula Alberti de Varennes e Mendonça, Carlos Manuel Arruda Pacheco, Manuel Armando Valeriano Madeira and Nuno Renato da Silva Cortez
**Web Site:** http://www.isa.utl.pt/home/node/3935

**1. Contact hours:**
**Lectures** 28 **Lecture/Praticals** 22 **Praticals/Laboratory** 20 **Others** 14 **Total** 84

**2. Objectives:**

General overview of basic concepts on soil characteristics, fertility, soil- plant relationships and nutrition form.
Basic principles of plant nutrition for crop production, fertilizer materials, crop fertilization, soil fertility maintenance, and practices for optimizing fertilizer use.

**3. Programme:**

Lectures: Soil constitution and properties
Soil concept and soil functions in ecosystems
Soil texture and soil mineral constituents
Soil organic matter. Components and fractionation. Humic substances: properties and interaction with soil mineral constituents
Cation and anion exchange capacity
Soil reaction: acidity and alkalinity
Soil Architecture. Porosity. Formation and stabilization of soil aggregates
Water retention in soil. Soil water energy concepts. Soil water characteristic curves. Measurement of soil water potential and content. Water movement in saturated and unsaturated soils
Soil aeration: nature and effects. Redox potential

Lectures: Plant Nutrtion
Introduction , definitionand classification of mineral nutrients
Soli Fertility. Nutrients availability in soils, Movement of nutrients in the soil.
Behavior of macronutrientes in soil.
Plant nutrients. Principals functions, deficiency and toxicity. Plant analysis.
Mineral nutrition and yield response
Mineral fertilizers, classification and characteristics. Manures. Fertilization techniques

Praticals
Soil sampling. Textural classes: “Feel” method and laboratory particle-size analyses. Organic matter fractionation. Cation exchange capacity.
Description and stability of soil structure
Soil water retention and movement.
Soil fertility. Hydrogen activity , P and K extractable, C organic, lime requirement, total carbonates determinations. Plant analysis. N-Kjeldahl determination.
Fertilization reconmendations

**4. Bibliography:**

**Main Bibliography**

Brady, N. C. & Weil, R.R. 1999. The Nature and Properties of Soil (12th edition). New Jersey, Prentice Hall.
Hillel, Daniel. 2004. Introduction to Environmental Soil Physics. Elsevier Academic Press, Amsterdam.
Marschner H 1995 Mineral Nutrition of plants.Acadenic Press London
Mengel K Kirby EA 2001 Principles of Plant Nutrition.Kluwer Acad. Publ.
Varennes A 2003 Produtividade dos Solos e Ambiente. Escolar Editora, Lisboa
White, R.E. 1997. Principles and Practice of Soil Science, (3rd edition). Oxford, Blackwell Science

**Other Bibliography**

Bacon PE 1995 Nitrogem fertilization in the environment. Marcel Dekker Inc.
Botelho da Costa, J. V. 1975. Caracterização e Constituição do Solo. Lisboa, Fundação Calouste Gulbenkian
Santos, JQ 1991 – Fertilização. Fundamentos da utilização de adubos e correctivos. Ed. Castro, F.L. Pub. Europa-América , Mem Martins
Tan KH 1998 Principles of Soil Chemistry, Marcel Dekker Inc

**5. Assessment:**

For of each module
- 2 or 3 questionnaires (40%) and one global test (60%) covering all the program course. With a classification of 10/20 the student will be excused to attend final examination of the module
Or - Final examination covering all the program course. The final classification must be 10/20 with a minimum of 9/20 on each module

**6.** Estimated Workload: 168 Hours

**7.** Last Update: 24/1/2011