**Code: 1355** **Molecular Ecophysiology**
**Degree:** 2nd cycle - Functional Biology
**Curricular Year: 1st** **Semester Course: 2nd**
**Credits: 6 ECTS** **Compulsory**
**Language:** Portuguese/English
**Responsible:** Maria da Glória Calado Inglês Esquível
**Other lecture(s):** Sara Barros Queiroz Amâncio, Ricardo Manuel Seixas Boavida Ferreira, Manuela Rodrigues Branco Simões, João Manuel Dias dos Santos Pereira, Maria Luísa Louro Martins e Miguel Pedro de Freitas Barbosa Mourato
**Web Site:** http://www.isa.utl.pt/home/node/3771

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

**2. Objectives:**

Plant- environment interaction: from whole plants to cells. Understanding physiological processes that underlie adaptation and acclimation to the environment (under optimal and stress conditions). We intended to provide a basic understanding of living organism response to environmental variations and gene expression under stress conditions.

**3. Programme:**

1- GENERAL CONCEPTS IN MOLECULAR STRESS PHYSIOLOGY CONTROL OF THE ENVIRONMENTAL AND METABOLIC FACTORS
The living organisms and the environmental factors. The definition of physiological stress.
Primary and secondary metabolism. Secondary metabolites: Biochemistry of secondary metabolites. Phenolic compounds, terpenes, alkaloids, nonprotein amino acids. Biotechnological use of secondary metabolites

2- STUDYING ABIOTIC STRESSES RESPONSES (PHYSIOLOGY, BIOCHEMISTRY AND MOLECULAR BIOLOGY).
Signalling transduction pathways in plant response to stress. Stress induced genes.
Drought and salt stress: plants strategies to cope with water deficits. Co-occurrence of others stresses. Effects on growth and metabolism. Regulation of gene expression. The signalling role of ABA. Diffusion (including stomatal and mesophyll conductance) and metabolic limitations to photosynthesis. Role of osmotic adjustment in adaptation. Mechanisms of resistance to salinity in microrganismos.
Flooding; alterations in growth, stomatal function and photosynthesis. O2 deficiency, excess CO2 and toxicity generated at the root system. Mechanisms of adaptation to flooding.
Oxidative stress: inductive agents and harmful effect
Heat stress: Effects on membrane stability. The role of heat shock proteins in cell tolerance to heat. Animal Stress and extreme temperatures
Cold stress: chilling and freezing stress. Physiological and molecular mechanisms of adaptation.
Pollution: direct and indirect effects of pollution (SO2, NOx, H2S e ozone). Underlying physiological and molecular mechanisms.

**4. Bibliography:**

**Main Bibliography**

Lambers H, Chapin III ES, Pons TL 2000 Plant Physiological Ecology. Springer verlag. ISBN 0.387.98326-0. New York

**Other Bibliography**

Papers to be recommended in each chapter.

**5. Assessment:**

**Practical work**
Experimental work to be carried out in a research group – work programme has to be presented and approved.
**Seminar**
Individual presentation of a topic to be agreed (15 min) and included in the respective lecture.

**Final evaluation**

Experimental work– 35%
Seminar -30%
Final exam – 35%

**6.** Estimated Workload: 168 Hours

**7.** Last Update: 14/7/2010