UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Plant Physiology

2627-3-E1301Q055

Aims

The objective of the course is to familiarize students with the main aspects of plant physiology and biochemistry through traditional lectures, group activities related to course materials and group discussions to obtain the following compentencies:

1. Knowledge and understanding: by the end of the course students will have acquired knowledge of the main physiological and biochemical processes of plants;
2. Applying knowledge and understanding: the learned concepts will provide students with a foundation to describe the fundamental role of plants in the natural environment and to envisage their possible applications within different fields of biology;
3. Critical thinking: by the end of the course students will be able to understand physiological mechanisms of plants and their biochemical processes and be able to correctly identify relationships between these two aspects;
4. Communication skills: at the end of the course students wil have acquired an adequate scientific language and will be able to properly explain the treated topics.
5. Communication skills: at the end of the course students will be able to read the scientific literature and will have the capacity to pursue further personal studies.

Contents

Aspects of plant physiology and biochemistry, which will include the the uptake and movement of water at the cellular and tissue level, transport and assimilation of essential nutrients, photosynthesis and cellular respiration and metabolism, the assimilation of nitrogen and sulfur, phytohormones, and the biochemistry of seed germination and seedling orientation in response to environmental signals.

Detailed program

Uptake and translocation. Plant water relations - Soil and water potential. Water movement. Transpiration and stomata regulation. Ion and solute uptake at the cell level. Phloem translocation. Nutrient uptake.
Photosynthesis: Photochemistry, electron transport; Calvin cycle and photorespiration. Regulation of Calvin cycle. CO_2 concentrating mechanisms (pumps, C4 and CAM plants).
Nitrogen (nitrate, ammonium, symbiosis) and sulfur assimilation .
Plant hormones: general aspects. Auxin: Structure, biosynthesis, catabolism and transport, physiological effects, molecular mechamism of cell enlargement and tropisms; gibberellins, cytokinins, abscisic acid, ethylene, brassinosteroids.
Seed germination. Plant orientation in the environment (light, gravity).

Prerequisites

No prerequisites. Useful background: botany, biological chemistry

Teaching form

Passive instruction (Instructor-led lectures): (5 CFU - 35 hours)
Active instruction (in-class activities such as experiment demonstrations and group problem-solving, flipped classroom): (1 CFU - 7 hours)

Textbook and teaching resource

L. Taiz, E. Zeiger, Fisiologia Vegetale, IV Italian Edition, Piccin Editore

Mauseth J.D. "Botanica. Fondamenti di biologia delle piante" - Idelson-Gnocchi, 2020

Semester

second

Assessment method

Written
The written exam will consist of 6 questions: 2 concentrating on the first part of the course (absorption and translocation of water, sugars and nutrients) and 4 on the second part of the course (photosynthesis, plant hormones). Students will be evaluated based on the level of knowledge demonstrated in their responses and their capacity to apply their knowledge on simple problem-solving exercises. No midterm exams are scheduled. A practice exam will be provided before the first exam date to aid students in their preparation.

Office hours

By appointment: emily.palm@unimib.it, paola.fusi@unimib.it

Sustainable Development Goals

QUALITY EDUCATION | LIFE ON LAND