האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

ECOPHYSIOLOGY OF PLANTS - 71312

Last update 26-09-2024

HU Credits: 2

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Plant Science in Agriculture

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Rehovot

Course/Module Coordinator: Dr. Yotam Zait

Coordinator Email: yotam.zait@mail.huji.ac.il

Coordinator Office Hours: none

Teaching Staff:

Dr. Yotam Zait

Course/Module description:

This course introduces the student to functionality of plants at the organismic level in their natural environment.

Course/Module aims:

The objective of this course is to provide an understanding of physiological mechanisms underlying plant responses to the abiotic and biotic environment in natural, agricultural and forestry ecosystems.

Learning outcomes - On successful completion of this module, students should be able to:

On successful completion of this module, students should be able to:
• describe the physical, chemical and biological conditions that plants encounter in their natural environment
• analyze the consequences of these conditions for survival, growth, biomass production, reproduction, species abundance and the geographical distribution of plants
• describe the key characteristics and processes relevant to the main plant resources, i.e. irradiance, energy, water, carbon and nutrients
• explain the ecophysiological processes as affected by biotic interactions and abiotic stress factors
• assess ways of adaptation and acclimation of plants to stress

Attendance requirements(%):

80

Teaching arrangement and method of instruction: 13 x 2 hours lectures

Course/Module Content:

1. Irradiance and energy 1: energy balance of leaves, plants and the ecosystem
2. Irradiance and energy 2: adaptation of plants to extreme physical conditions
3. Water 1: water balance of the plant, water uptake and transport, transpiration, the soil-plant-atmosphere continuum
4. Water 2: water potential, pressure-volume curves, hydraulic conductance and vulnerability, embolism, hydraulic safety margins
5. Stable isotopes as a major tool to identify ecophysiological processes
6. Water 3: impact of drought on the water balance of plants, acclimation and

adaptation to drought
7. Water 4: impact of stress (other than drought) and of competition on the plant water balance
8. Water 5: mechanisms leading to dieback and mortality in plants under drought stress, upscaling of the water balance to the ecosystem level
9. Nutrients 1: nutrient uptake and distribution in the plant, nutrient use efficiency, nutrient resorption in perennial plants
10. Nutrients 2: nutrient uptake under abiotic stress, such as high salinity, adaption to these stresses
11. Carbon 1: photosynthesis under stress, adaption of the photosynthetic apparatus to stress and to high atmospheric CO2 concentration
12. Carbon 2: respiration and respiratory processes in different plant parts, impact of stress on respiration and adaptation of the respiratory system to these stresses, plant carbon balance
13. Carbon 3: growth and biomass production, carbon allocation in the plant, source-sink relationships, root-shoot interrelations, transport and storage of assimilates in plants
14. Carbon 4: growth under stress, biotic influences on growth, upscaling of the carbon balance to the ecosystem level

Required Reading:
none

Additional Reading Material:
Lambers H, Oliveira RS. 2019. Plant physiological Ecology. 3rd ed., New York : Springer Verlag.

Nobel PS. 2009 Physicochemical and environmental plant physiology. 4th ed., Boston : Elsevier.

Bresinsky A, Körner C,
Kadereit JW, Neuhaus G
Sonnewald U. 2013.
Strasburger's Plant Sciences. Springer-Verlag Berlin Heidelberg

Grading Scheme:
Written / Oral / Practical Exam 100 %

Additional information:
Recording and revealing the recordings to anyone interested