



The Hebrew University of Jerusalem

Syllabus

ECOPHYSIOLOGY OF PLANTS - 71312

Last update 27-09-2017

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. Jose Gruenzweig

Coordinator Email: jose.gruenzweig@mail.huji.ac.il

Coordinator Office Hours: none

Teaching Staff:

Prof Amnon Schwartz
Prof Jose Gruenzweig

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: 14 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*

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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:

Fitter A and Hay R. 2002. Environmental physiology of plants. 3rd ed. San Diego, CA: Academic Press. 571.2 FIT

Jones HG, Flowers TJ and Jones MB. 2008. Plants under stress: biochemistry, physiology, and ecology and their application to plant improvement. Cambridge: Cambridge University Press. (library has only the 1989 ed. 632 PLA)

Lambers H, Pons TL and Chapin FS III. 2008. Plant physiological ecology. 2nd ed., New York : Springer Verlag. 571.2 LAM

Larcher W. 2003. Physiological plant ecology: ecophysiology and stress physiology of functional groups. 4th ed., Berlin : Springer Verlag. 581.5 LAR

Nobel PS. 2009 Physicochemical and environmental plant physiology. 4th ed., Boston : Elsevier. (library has only the 2004 ed. 581.1 NOB)

Course/Module evaluation:

End of year written/oral examination 100 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %
Assignments 0 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:
none