



## *The Hebrew University of Jerusalem*

### *Syllabus*

## **MINERAL NUTRITION OF HIGHER PLANTS - 73907**

*Last update 22-09-2024*

*HU Credits:* 3

*Degree/Cycle:* 2nd degree (Master)

*Responsible Department:* Field and Vegetable Crops-International Prog.

*Academic year:* 0

*Semester:* 1st Semester

*Teaching Languages:* English

*Campus:* Rehovot

*Course/Module Coordinator:* Dr. Nirit Bernstein

*Coordinator Email:* [Nirit@agri.gov.il](mailto:Nirit@agri.gov.il)

*Coordinator Office Hours:* By appointment

*Teaching Staff:*

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Prof. Nirit Bernstein

Course/Module description:

Students will learn the mechanisms for mineral nutrients uptake and transport in the plant body, and their effect on the physiological status of the plant. The role of the various micro and macroelements in physiology and metabolism will be presented and discussed, and so will the physiological implications of deficient and toxic levels. In the exercise, research manuscripts in the field of plant nutrition will be critically evaluated.

Course/Module aims:

1. To provide a comprehensive understanding of processes involved in mineral-nutrients uptake and transport in the plant, and roles of mineral nutrients in plant physiology and metabolism. 2. To develop skills and practice for critical evaluation of manuscripts in the area of Mineral nutrition of plants.

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

- Critical evaluation of scientific manuscripts in the field of "Mineral Nutrition of plants".
- Knowledge and understanding of processes of mineral uptake into roots; in-roots transverse translocation to the xylem; xylem loading; translocation in the xylem and in the phloem; and cycling and re-mobilization of mineral nutrients in the plant.
- Know and understand relationships between processes of mineral uptake and transport in the plant and development of physiological disorders.
- Understand and know roles of selected macro and microelements in plant physiology and metabolism (i.e., including but not limited to: N, P, K, Ca, B).
- Understand the relation between irrigation and fertilization.
- Know and understand the effect of salinity on mineral uptake and translocation, and the nutritional status of the plant.
- Describe central methodologies used for plant mineral nutrition research.

Attendance requirements(%):

90

*Teaching arrangement and method of instruction: Lectures and exercise (which includes critical reading of manuscripts and submission of written critiques, and in groups- preparation of a presentation for one of the evaluated manuscripts.*

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Course/Module Content:

- *Plant structure in relation to uptake and transport processes.*
- *Mineral uptake into roots.*
- *In-root transport of minerals to the xylem*
- *Mineral transport processes in the plant body (translocation, re-translocation, re-mobilization and cycling).*
- *Interaction between ions in uptake and transport processes.*
- *The nitrogen transformations (oxidizing and reducing reactions) as the driving force in plant growth and metabolism.*
- *The role of N, P, K, Ca, Mg and selected microelements in plant physiology and crop quality.*
- *Deficiencies and toxicities of mineral elements.*

Required Reading:

*Critical reading of 3-6 manuscripts.*

Additional Reading Material:

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Grading Scheme:

*Written / Oral / Practical Exam 65 %*

*Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 16 %*

*Presentation / Poster Presentation / Lecture 19 %*

Additional information:

*The exercise starts at the 4th or 5th week. During the initial weeks of the course 4 hrs lecture/week are given.*