The Hebrew University of Jerusalem

Syllabus

PHYSICS OF SOIL WATER - 71622

Last update 09-01-2014

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Soil and water sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: hebrew

Campus: Rehovot

Course/Module Coordinator: Dr. Ran Holtzman

Coordinator Email: holtzman.ran@mail.huji.ac.il

Coordinator Office Hours: 15-16

Teaching Staff:

Dr. Ran Holtzman
Yonatan Ganot
Oshri Borgman

Course/Module description:

Soil-water relations. Measurement of soil-water content. Hydrostatics Osmotic pressure. Surface tension. Soil-water retention curves. The hysteresis phenomenon. Diffusion and mass transport. Darcy's Law. Flow in confined and unconfined layers. Unsaturated flow. Hydraulic conductivity in saturated and unsaturated soils. Infiltration and evaporation from soils. Water content profiles under wetting and drying processes. Water availability to plants.

Course/Module aims:

Providing basic understanding of the processes controlling water retention and flow in soils, including basic principles/definitions and simple models to describe the forces acting on water in static and dynamic (flow) conditions, at saturated and unsaturated conditions.

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

Understand the very basic principles and concepts that are required for quantitative description of water retention and flow in saturated and unsaturated conditions.

Attendance requirements(%):

0

Teaching arrangement and method of instruction: lectures and exercises

Course/Module Content:

- *Units and dimensions, basic soil properties.*
- *hydrostatics: pressure layout,estimation of hydraulic forces.*
- *Surface tension and capillary forces.*
- *water potential in soil, water linkage.*
- *Saturation flow: Darcy's law, hydraulic conductivity, wash.*
- *mass balance (continuity equation).*
- *unsaturated flow.*
- *constant and unconstant flow problems*

Required Reading:

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Additional Reading Material:

- *Jury, W.A., Gardner, W.R., and Gardner, W.H., Soil Physics, 5th Ed., 1991.*
- *Warrick, A.W., Soil Water Dynamics, 2003.*
- *Koorevaar, P., Menelik, G. and Dirksen, C. Elements of Soil Physics, 1983.*
- *Hillel, D., Fundamental of Soil Physics, 1980.*

Course/Module evaluation:

End of year written/oral examination 70 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 10 %
Reports 0 %
Research project 0 %
Quizzes 20 %
Other 0 %

Additional information: