

<p>The Hashemite University Faculty of Natural Res. & Environ. Dept. Land Management & Environ. 2nd Semester, 2010/2011</p>		<p>Dr. Mohammed I. Al-Qinna qinna@hu.edu.jo Soil Water Plant Relationships (1202364) 3 Credit Hours</p>
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Courses Description:

This course concentrates on the ecological importance of water, thermal water properties, solution physical laws, such as vapor pressure, solution potential and latent heat. It tackles the plants relation with the soil's physical properties, as in apparent specific gravity, soil compactness, soil water and soil temperature regimes, soil water replenishment of the roots and the mechanisms of water transport within the soil-plant system. The course discusses the factors affecting ET and the technology employed in ET reduction, the direct measuring of ET's depletion, lysimeter and pan evaporation.

Course Objectives:

The aim of this course is to give essential understanding of the factors affecting, and the techniques of measuring, the entry, retention, and movement of water into and through the soil-plant system. It considers the accessibility and significance of water to plants, atmospheric water and the transport of water through plants.

Course Outline	Week
<p>Introduction</p>	<p>1</p>
<p>Functions and Properties of Water 1- Introduction, 2- Functions of water in plants, 3- Properties of water, 4- Properties of aqueous solutions.</p>	<p>2-3</p>
<p>Fundamental Concepts of Soil-Water System 1- Soil fundamentals, 2- Soil-water interactions, 3- Soil-water potentials, 4- Soil-water retention, 5- Water movement in soil.</p>	<p>4-5</p>
<p>Plant Water Status and Potential 1- Relative water content, 2- Water Potential, 3- Cell structure and osmosis, 4- Total water potential, 5- Plant water potentials, 6- Water potential of plant components' parts, 7- Dehydration and rehydration, 8- Water relations of cell in tissues.</p>	<p>6-7</p>

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<p>Absorption of Water and Root and Stem Pressures 1- Absorption mechanisms, 2- Characteristics of root pressure exudation, 3- Stem pressure, 4- Latex and Oleoresins, 5- Absorption of dew and fog, 6- Factors affecting water absorption through leaves.</p>	8-9
<p>Soil-Plant-Atmosphere Continuum (SPAC) 1- Definition, 2- Flow of water and distribution of water potentials in the SPAC, 3- Plant-water balance dynamics, 4- Daily cycle of plant water components.</p>	10-11
<p>Transpiration 1- Process of transpiration, 2- Factors affecting transpiration, 3- Measurement of transpiration and evaporation.</p>	12-13
<p>Movement of Soil-Water to Roots and Extraction by Roots 1. Macroscopic root system models, 2. Single-root models, 3. Drought-stressed plants.</p>	14-15
<p>Effects of Drought Stress on Plant Productivity 1. Definition of water use efficiency, 2. Crop yield and transpiration, 3. The plant-available water capacity of soil.</p>	16

Books:

- Kramer, P.J., and J.S. Boyer. 1995. Water Relations of Plants and Soils. Academic Press. Inc., USA.
- Scott, H.D. 2000. Soil Physics: Agricultural and Environmental Applications. Iowa State University Press, Ames, Iowa.
- Iwata Shingo, Toshio Tabuchi, and Benno P. Warkentin. 1995. Soil-Water Interactions. Mechanisms and Applications. 2nd Ed., Marcel Dekker, Inc.
- Sterling A. Taylor. 1972. Physical Edaphology. ; the physics of irrigated and nonirrigated soils. W.H. Freeman, San Francisco.

Evaluation:

First Hour Exam	25%
Second Hour Exam	25%
Final Hour Exam	50%