

Course Name	Code\No.	Number of Credits			
		Theo.	Lab.	Train.	Credit
Soil-Water Relationship	HWR 211	2	2	-	3
Pre-Requests	MATH 110 - PHYS 110				

Course Objectives:

To teach student the relationships and the interactions between soil and water from the hydrological and agricultural aspects. Understanding soil physical properties and measuring these properties in the field and laboratory are the main part of this course. Traditional and modern devices and methods in measuring soil characteristics and water status and movement within the soil are the main practical parts in training students during this course.

Course Contents:

1. Introduction to soil description, soil formation, soil classification
2. Soil physical properties including the relation between weight and volume
3. Soil texture, soil structure and soil moisture content
4. Soil tension, how to measure it and its relation with moisture content
5. Infiltration: an introduction, descriptions, Horton's Equation, Philip's Equation and Green-ampt equation
6. Water movement in saturated soil: descriptions, Darcy's law and determination and measuring soil hydraulic conductivity.
7. Water movement in Un-saturated flow: introduction, descriptions, water flow equations in un-saturated zone and the relation between soil-water tension and soil hydraulic conductivity.
8. Laboratory classes are designed to teach students how to: sample soil in the field, determine bulk density and actual density, determine soil porosity, determine and measure soil water content, determining soil texture and soil structure, determine soil particle distributing, determine pore size distribution, measure soil hydraulic conductivity and infiltration, develop soil-water characteristic curves, and determine water tension in the soil and field capacity in the field.

Course Outcomes:

At the end of this course, students should be able to:

- Understand physical properties of soil and how to determine them in the lab and field
- Understand the hydraulic properties of soil and how to measure them in the lab and field
- Recognize soil-water measuring devices and use them in the field and lab
- Use all water flow equations in saturated and un-saturated conditions
- Understand and apply infiltration equation
- Determine flow direction upon soil tension data
- Develop soil-water characteristic curve
- Understand the soil particle distribution and pore size distribution

Evaluation Method:

Student are evaluated upon periodical exams, final exam and class homework, class discussions as well as lab experiments and lab reports and exams

References:

- Hillel, D. (1982) Introduction to soil physics, Academic press, New York
- Hanks, R.J. (1992) Applied soil physics ,Springer verlag
- Or., D. and Wraith, J.M. (2001) Agricultural and environmental soil physics, section
- Class handouts