

Syllabus of Groundwater Hydrology

Textbook			
References		1- Kruseman G.P.& DeRidder, N. A., 1990. Analysis and Evaluation of Pumping Test Data. International Institute for Land Reclamation and Improvement, Wageningen, The Netherlands. 2-Sen, Z., 1995. Applied Hydrogeology for Scientists and Engineers. Lewis Publications, Boca Raton. 3-Todd, D. K., 2005 Groundwater Hydrology. John Wiley & Sons. New York. 4- Raghunath, H. M.,1982. Groundwater. Wiley Eastern Ltd., New Delhi. 1-عصام محمد و عباس عبدالله, 2002, الهيدرولوجيا, دار جامعة السودان 2- عبدالعزيز البسام 2002 م . المياه الجوفية. الرياض- السعودية.	
		week	Date
1		Basic Concepts of Groundwater Hydrology -Introduction of Groundwater - What is the groundwater? - Classification and types of groundwater -Basic definitions: (aquifers, Aquitard, Aquiclude, Aquifuge Unsaturated zone and saturated zone.)	
2		-Hydrologic budget and groundwater sources. -Concepts of groundwater pollution	
3		Aquifers -Aquifers classification: (confined, unconfined and leaky) - Aquifer Parameters: (porosity, recharge and discharge, hydraulic conductivity, transmissivity, storativity, specific yield) - Anisotropy and heterogeneity	

4		Groundwater flow - Steady state and unsteady state flow - Driving forces of groundwater flow - -principles laws of groundwater flow (Darcy's law)	
5		Quiz with resolve problems and discussion	
6		Groundwater Resources Development - Exploration -Evaluation -Exploitation Geological, Hydrological and Geophysical Methods for Groundwater Exploration.	
7		Wells - Well Drilling Methods : - Methods of Drilling Shallow Wells: Hand-Dug wells, Bored wells, Driven wells, injected well. - Methods for Drilling Deep wells:Cable tool method, Rotary method, Reverse Circulation Rotary Method.	
8		Exam of Midterm	
9		Well Completion -Placement of casing -Cementing of casing -Placement of well screen -Gravel packing.	
10		Requirement for Water Well Design - Limitations of dimensions and diameters of casing piping -Intake area: design of well screen, gravel pack design.	
11		Quiz with resolve problems and discussion	
12		Groundwater & Pumping Tests -Steady State Radial Flow to Wells: In Confined Aquifers and Unconfined Aquifers	

13		-Unsteady State Radial Flow: Theis's Method and its application, Jacob's Methods (Jacob I, Jacob II, Jacob III)	
14		-Large Diameter Wells: Volumetric Method (Sen 1983), -Discharge calculation from early drawdown data (Sen 1986). -Leaky Aquifers: Inflection Point Method (Hantush,1956). - Recovery Tests.	
15		Quiz with resolve problems and discussion	