

Course Name	Code\No.	Number of Credits			
		Theo.	Lab.	Train.	Credit
Principle of Groundwater Hydrology	HWR 231	3	-	-	3
Pre-Requests	MATH 110, PHYS110				

Course Objectives:

The main objective of this course is to teach students the fundamentals of groundwater occurrence in nature and its movements. In addition, it aims to teach the basic terminologies in the field of groundwater hydrology.

Course Contents:

1. Hydrologic cycle and groundwater: Elements of water cycle in nature and its relation to groundwater; Basic definitions; Global distribution of groundwater; Hydro-geological environments.
2. fundamental of groundwater flow: Darcy's law; Darcy's experiment; Darcy's law components; Application of Darcy's law; Fluid potential derivation; Groundwater instrumentation; Groundwater flow magnitude and direction.
3. Porous medium classification: hydraulic conductivity definition and its methods of determination in aquifer under horizontal and vertical flow; Homogeneity and Isotropy of porous medium; Equivalent hydraulic conductivity.
4. Aquifers: Types; Properties; Specific storage; Storage coefficient; Specific yield; Resource evaluation.
5. Groundwater flow equations: Derivation of flow equation; Descriptive flow equations under different conditions; one dimensional solution of flow in confined and unconfined.
6. Flow to wells: Radial flow; Radial flow equation derivation; evaluation of aquifer properties; Pumping and recovery tests; Use of computer programs for properties evaluation.

Course outcomes:

It is expected that the student would get acquainted to the following topics:

- The nature of groundwater and its occurrence.
- Evaluation of groundwater resource for a given region.
- Methodologies of aquifer properties evaluation.
- Governing groundwater flow equation under different environment.

Evaluation Method:

Student can be evaluated upon monthly exams, final exam and class homework, class discussions as well as lab experiments and lab reports

References:

- **David Keith Todd, Larry W. Mays**, Groundwater Hydrology, 3rd Edition 2005, ISBN: 978-0-471-05937-0
- **Fetter , C. Jr.** Applied Hydrogeology, 2000 (4th Edition), ISBN-13: 978-0130882394
- **Domenico, P. A. and Schwartz, F. W.** (1990) Physical and chemical hydrogeology, John Wiley & Sons, New York, 824 p.
- **شبلاق، محمد (١٩٩٨)** الهيدروولوجيا التطبيقية، منشورات جامعة عمر المختار.