

SIO 106

M, W (11:00-12:20pm)
(Vaughan Hall 100)

Introduction to Hydrogeology

Fall 2013

K.M. Brown (2-4077; kmbrown@ucsd.edu; Munk 320)
D.R. Hilton (2-0639; drhilton@ucsd.edu; Vaughan 202)

An introduction to concepts and practice of hydrogeology aimed at both SIO graduate students (but particularly those in the Earth Section - GS, GP and MC&G curricular groups) as well as UCSD/SIO M.S./B.S students with a solid background in the Earth Sciences.

Recommended Texts

- Groundwater Science by C.R. Fitts (Academic Press)

Additional Reading Texts

- Groundwater by R. A. Freeze and J.A. Cherry (Prentice Hall)
- Hydrogeology – Principles and Practice by K. Hiscock (Blackwell Publishing)
- Applied Hydrogeology by C. W. Fetter (Prentice Hall)

Grading

Evaluation will be by final and mid-term exams and homework assignments. Marks will be divided as follows: Final exam (45%); mid-term exam (25%); Homeworks (30%).

Lectures are 80 minutes (Monday and Wednesday). Grading: letter grade, except by consent of instructor.

Location & Class material

All classes will be held at SIO (Vaughan Hall) Room 100 at 11 am -12:20 (MW).

All lecture presentations (Powerpoints) and homework assignments/presentation materials are available at Dropbox (KM) and TED (DH).

Class Syllabus

Date	Topic	Instructor
Sept 30	Lecture 1- General introduction ; scope of class etc. quantifying the water cycle, Water holding elements and component of the water cycle. The water-cycle mass balance equation.	
Oct 2	Lecture 2- Properties of aquifers #1 (porosity, effective stress, and fluid pressure/overpressure, consolidation)	
Oct 7	Lecture 3- Properties of aquifers #2 (Darcy's law, hydraulic conductivity, permeability, permeability measurements aquifers and aquitards)	
Oct 9	Lecture 4 - Prop. of aquifer #3 (Transmissivity, specific storage, compressibility, K in anisotropic and fractured systems, Limits to Darcy's law, partially saturated aquifers Specific yield,)	
	Practical 1 - Beach walk anytime during week (TBA)	
Oct 14	Lecture 5 Principals of groundwater flow #1 (Head gradients, flow nets, steady state flow, transient flow)	
Oct 16	Lecture 6- Principals of groundwater flow #2 (Head gradients, flow nets, steady state flow, transient flow) - Practical 2 – Worked examples	
Oct 21	Lecture 7 Groundwater investigations techniques #1, Precipitation, Evapo-transpiration, Soil moisture and infiltration, recharge estimation, stream gauging quick flow and base flow.	
Oct 23	Lecture 8- Groundwater investigations techniques (#2) -Field estimation of aquifer properties (Well tests)	
Oct 28	Lecture 9 - Groundwater investigations techniques (#3) -Field estimation of aquifer properties (Well tests) Practical 2 – Worked examples	
	Revision session TBA	
Oct 30	MID-TERM EXAM	
Nov 4	Lecture 10 Groundwater Chemistry I (Properties of water; concentration nomenclature; groundwater chemistry & facies; presentation of data)	
Nov 6	Lecture 11 Groundwater Chemistry II (chemical equilibrium; carbonate chemistry; adsorption and ion exchange; redox chemistry)	
Nov 11	Veterans Day Holiday	
Nov 13	Lecture 12 Environmental Isotopes I (isotope notation; World meteoric water line; Age dating of groundwater)	
Nov 18	Lecture 13 Environmental Isotopes II (Age dating cont.; Noble gases)	
Nov 20	Lecture 14 Groundwater Quality I (water quality; transport of contaminants)	
Nov 25	Lecture 15 Groundwater Quality II (Sources of groundwater contamination)	
Nov 27	Lecture 16 Groundwater Pollution – remediation techniques THANKSGIVING HOLIDAY	
Dec 2	Lecture 17 Groundwater Pollution – protection	
Dec 4	Lecture 18 Review Session	
Dec. 10	Final Exam (11:30a-2:30p)	