

Where: Vaughan Hall 100

When: M, W 2:00-3:20pm

Who: K.M. Brown (kmbrown@ucsd.edu; Munk 320)

J.K. Willenbring (jwillenbring@ucsd.edu; Vaughan 210)

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.

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

Recommended 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 (35%); mid-term exam (35%); Homeworks (30%).

Lectures are 80 minutes. Grading: letter grade, except by consent of instructor.

Class material: lecture presentations (Powerpoints) and homework assignments/presentation materials are available on Google Drive.

Additional Reading Texts: Class Syllabus

Instructor Goals. At a minimum, I hope to pursue the following goals and solicit your open and timely feedback on how well we are meeting these goals:

- Communicate effectively and frequently;
- Be an enthusiastic, active and involved;
- Demonstrate a mastery of the discipline;
- Relate material to current practices;
- Clearly explain complex concepts and ideas;
- Provide a framework for lifelong learning;
- Strive to involve participant in class activities;
- Be available to assist participants in or out of class; and
- Have respect and concern for all participants.

DATE	LECTURE/ INSTRUCTOR	TOPIC
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,)
(TBA)		Practical 1 - Beach walk anytime during week
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 3 – Worked examples

Oct. 30		MID-TERM EXAM
Nov. 4	Lecture 10	Groundwater Chemistry I: Properties of water; concentration nomenclature; groundwater chemistry presentation of data
Nov. 6	Lecture 11	Groundwater Chemistry II: Chemical equilibrium; carbonate chemistry
Nov. 11	Lecture 12	No class – Veteran’s day
Nov. 13	Lecture 13	Groundwater Chemistry III: Adsorption and ion exchange; redox chemistry. Handout HW I
Nov. 18	Lecture 14	Environmental Isotopes I: Isotope notation; World meteoric water line; Age dating
Nov. 20	Lecture 15	Environmental Isotopes II: Age dating cont.; Noble gases. HW1 due. Handout HW2
Nov. 25	Lecture 16	Environmental Isotopes III: Two water worlds
Nov. 27	Lecture 17	Groundwater Quality I: Water quality; transport of contaminants
Dec. 2	Lecture 18	Groundwater Quality II: Sources of groundwater contamination) HW2 due
Dec. 4	Lecture 19	Groundwater Pollution: Remediation techniques & protection
Dec. 11	Exam	Final Exam 3pm – 6pm

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged. Contact the OSD for further information: 858.534.4382 (phone); osd@ucsd.edu(email); <http://disabilities.ucsd.edu> (website)