

**SYLLABUS GEOGRAPHY 116/GEOLOGY 173 GROUNDWATER  
FALL 2007 UCSB**

**Instructor:** Hugo A. Loáiciga (hugo@geog.ucsb.edu); <http://www.geog.ucsb.edu/~hugo>

**Office:** 5712 Ellison Hall

**Office hours:** Tuesday 12:30–1:30 pm; Thursday 10 am – 10:50 am, or by appointment, Rm 5712 Ellison

**Teaching Assistant:** Nina Kilham email: nina@icess.ucsb.edu

**Office:** 4027 Bren Hall (Lab side); **Office hours:** Tuesday 4-5 pm; Wednesday 12 – 1 pm.

**Lecture:** Tuesdays, Thursday: 11 am-12:15 pm; Ellison 3621

**Laboratory:** Wednesday 5-7 pm 2610 Ellison Hall: **see note 5, page 2 and 3.**

**Textbook:** Applied Hydrogeology, 4<sup>th</sup> edition, by C.W. Fetter; Hydrogeology Laboratory Manual, 2<sup>nd</sup> Ed. by Lee et al., UCSB Bookstore; Reader: Grafikart, Isla Vista.

**Reserve Book Room (RBR):** One copy of the Textbook and Lab. Manual (to be announced)

**Prerequisites:** Geog. 3B (recommended), Geog. 112 (recommended)

**Desired:** introduction to physical geography/geology, basic calculus, algebra, trigonometry

GRADING (see Notes 1, 2, 3, 4, 5, 6).

Item	Date or date due	Weight, %
Midterm 1	Thursday, October 25	14
Midterm 2	Tuesday, November 27	16
Homework	11:00 am in class Thursdays or TBA	16
Laboratory	11:00 am due date (see Note 5, pages 2,3)	25
Final	Thursday December 13, 12:00 – 3 pm, in lecture room.	29
<b>TOTAL</b>		<b>100%</b>

All exams are in the assigned lecture classroom. The exams are open book.

*FIRST DAY OF CLASSES: THURSDAY SEPTEMBER 27; LAST DAY OF CLASSES: THURSDAY DECEMBER 6. HOLYDAY: THURSDAY NOVEMBER 22.*

**COURSE CONTENTS**

Week	Subject Item	Textbook Chapter	Tentative homework problems
1,2	Geology and groundwater	1,2, 8	1.8, 1.13, 2.14; Analysis, part b. p. 109 +Fig. 3.32 on page 110.
3,4	Properties of aquifers	3,6	3.8, 3.10, 3.18, 6.1 ; Analysis, part b., p.147
5,6	Principles of ground-water flow	4,7, 6	4.3, 4.8, 4.10, 4.17; problem6.doc; 4.14; problem7.doc
7,8	Ground water wells	5	5.1, 5.3, 5.4; problem4.doc
8,9	Regional ground-water flow	7 (9)	7.2, 7.3, Problem8.doc,
9,10	GW contamination and Management (field methods)	10,11 (9,12)*	10.5, 10.7

\*: possible coverage, dependent on time availability.

**Course objectives:** This course is aimed at providing the student with a comprehensive introduction to the most important topics in groundwater hydrology/hydrogeology. The teaching format consists of the presentation of key concepts followed by problem solving and laboratory practice. This course will

prepare students to analyze ground-water flow interactions taking into account aquifer properties, basic hydraulic factors, geologic controls, and their temporal and spatial interactions. Mastery of concepts relies on quantitative analysis.

## NOTES

1. Attendance to lecture is generally not required. However, there is no AS note-taking for this class, and homework, laboratory, and test questions depend heavily on lecture notes and instructions. Past experience shows that failure to attend lectures regularly leads to deficient grades in this course.

2. Homeworks and laboratory reports are due on Thursdays of assigned weeks at 11 am, in class, unless otherwise specified by the Instructor. Instructions for homework and laboratory report preparation will be given in class. Turn all due work to the teaching assistant or to the instructor if the TA is not present. Late homeworks and reports are not accepted, and will automatically result in a grade equal to zero.

3. Make-up exams, homeworks, reports, and laboratories will not be accepted or administered. Failure to take an exam or submit a scheduled assignment will result in an automatic grade of zero. Under exceptional conditions, a medical condition **may** entitle a student to a make up a missed test or assignment, provided that a medical certification extended by a licensed physician in the State of California is presented within 48 hours of the scheduled time of the exam or due time of the assignment. The certification must be submitted to the Instructor together with an explanation on how/why the medical condition prevented the student from fulfilling his/her course work.

4. All exams are written, in class, open-book, and to be worked out independently by each student. Students are required to bring a battery-powered calculator in good working condition to the exams. No sharing of calculators, information, or other materials is permitted during the exams.

5. The laboratory includes: (I) data interpretation and analysis based on the Laboratory Manual by Lee and Fetter, (II) laboratory experimentation with a flow net simulator and a permeameter, (III) computer analysis of pumping test data, and (IV) field practice of spring-flow measurement and spring water-quality testing. The first laboratory will be a MS EXCEL practice that will prove useful for students in problem solving. **See a summary of the lab. contents and weights, meeting dates and places, report due dates, in the TABLE on page 3. All the lab reports are due at 11:00 am on the due date.**

**Lab I:** all in room 2610 Ellison. The laboratory assignments from the Laboratory Manual are: (I-1) Lab. 16 (“Seymour Hazardous Waste Site-I, Hydrogeologic setting”, p. 121-126) (worth 4 %); (I-2) Labs. 19-21 (“Ground-water Basin Analysis p. 141-144) (worth 4%); (I-3) Lab. 8 (“Modeling ground-water flow with flownets” p. 59-66) (worth 4%).

**Lab II:** room 3610 Ellison. Students will conduct an experimental test to measure hydraulic conductivity with a constant head permeameter; in addition, ground-water flow will be estimated using a flow net in a sand tank. There will be two dates to do this lab, only one of which a student needs to sign up for. Sign up sheets are posted on the board of the Hydrolab, room 3610 Ellison Hall. Priority is first come, first served. Students will collect data during the experiment and present a report on the due date (worth 4%).

**Lab. III:** room 2610 Ellison. Students will learn the computer model **Aqtesolve** for pumping-test data analysis. Data sets will be distributed and the students must present a report of computer results on the due date (worth 4%).

**Lab. IV:** spring-flow measurement and basic water-quality testing will be conducted at the Barker adit spring in the west fork of Cold Springs Creek, Montecito, California. Students will submit an individual report containing the data and analysis of the data collected in the field. Transportation shall be provided by UCSB. No personal vehicles allowed. A written report is due on the due date (worth 5%).

TABLE: summary of the lab. contents and weights, meeting dates and places, report due dates.

LABORATORY	%	DATE OF PRACTICE	DUE DATE (9:30 am in class)
EXCEL data analysis-training		Wednesday October 3; 5-7 pm Ellison Hall 2610	Not applicable
(I) Laboratory manual: I-1: Lab. # 16 (p. 121-126 lab manual) I-2: Lab. # 19-21 (p. 141-144) I-3: Lab. # 8 (p. 59-66)	4 4 4	Wed. Oct. 10, Ellison 2610, 5-7 pm Wed. Oct. 24, Ellison 2610, 5-7 pm Wed. Nov. 7, Ellison 2610, 5-7 pm	Tuesday Oct. 23 Thurs. Nov. 8 Tuesday Nov. 20
(II) Lab. Experiment: hydraulic conductivity & flownet in a sand tank	4	Wed. Nov. 14, 5-7 pm; Ellison 3610 <b>or</b> Wed. Nov. 21, 5-7 pm; Ellison 3610	Thurs. Nov. 29
(III) Computer analysis of pumping-test data	4	Wed. Nov. 28; 5-7 pm Ellison 2610	Tuesday Dec. 4
(IV) Spring-flow measurement and water testing	5	Sat. Nov. 10; 10:00 am-2 pm Meet at 9:50 am, UCSB's MTD main bus stop	Thurs. Nov. 15
TOTAL:	25		

LAST OF CLASSES: THURSDAY DECEMBER 6