

SYLLABUS

GEOL 315: SURFACE AND NEAR SURFACE PROCESSES

Spring 2012

MWF 10:10 – 11:00 am, Calcott (CSSC) 201

Instructor: Professor Alicia Wilson, Department of Earth and Ocean Sciences
Rm. 302 Earth and Water Sciences Building, 777-1240;
awilson@geol.sc.edu
Office hours: Monday, Wednesday 11 am – noon or by appointment.

IAs: Tyler Evans and Brad Peurifoy
Department of Earth and Ocean Sciences
Rm. 301 Earth and Water Sciences Building, (803) 777-6969;
tevans@geol.sc.edu; bpeurifoy@geol.sc.edu
Office hours: TBA and by appointment

Lab Sections: 1. Wed, 2:15-5:15 pm, EWSC 208
2. Th, 12:30-3:30 pm, EWSC 208
3. Th, 3:40-6:40 pm, EWSC 208

Required Text: *Physical Hydrology (2nd Ed.)*. S. Lawrence Dingman, 2008, Waveland Press Inc.

Recommended text (on reserve at the library):
Applied Hydrogeology (4th Ed.). C.W. Fetter, 2001, Prentice Hall.

Course Goals

This course will cover basic principles of hydrology and geomorphology. We will consider the movement of surface water, groundwater, and sediments, and investigate the interactions between water and sediments/rocks near Earth's surface. Students will also develop written communication skills through lab and homework assignments.

Learning Objectives

By the end of the course, successful students will

1. Clearly explain basic concepts in hydrology and geomorphology
2. Use mathematical expressions to answer questions about, for example, movement of water, contaminants, and sediments or thresholds for slope failure
3. Use lab and field techniques to determine parameters that go into mathematical expressions (e.g. the expressions in #3)
4. Collect spatial data by surveying and other field techniques
5. Draw and interpret contour maps of spatial data (e.g. from #4)
6. Interpret statistical data, e.g. flood frequency plots
7. Effectively communicate scientific concepts in written assignments

Topics

The Hydrologic Cycle
Infiltration, Evapotranspiration, and Runoff
Storms, Floods, and Stream Hydrographs
Stream Processes, Open Channel Flow
Weathering and Erosion
Forest and Wetland Hydrology
The hydraulic properties of sediments and rocks
Hydraulic head and Darcy's Law
Regional groundwater flow systems
Water supply and well tests
Basic concepts in groundwater contamination and remediation

Labs

The lab is designed to elaborate on topics introduced in the lectures, primarily through experiments in the lab and in the field. Don't miss lab – there are no makeups!

Course Requirements

Homework and in class assignments. Homework will be assigned each week or every other week. Students will also work problems in class.

Examinations. There will be two midterms and a final. Material on the exams will come from lectures, homework, and labs. The final will be comprehensive.

Labs. Labs meet every week. (Attendance and participation is mandatory.)

GRADING

Homework & In-class work	25 %
Midterm Exams (2x12.5%)	25 %
Final Exam (Tuesday May 1, 9 am)	20 %
Labs	30 %

Communication

Dr. Wilson and the IAs will send announcements via Blackboard. Make sure that the email that Blackboard has is one that you read! (I will send a test message the first week of class so you can confirm that your settings are correct.)

PROPOSED COURSE SCHEDULE

Week	Exams & Readings	Dates	Topics
1	Dingman Ch 2, Appendix A	9, 11, 13 Jan	Introduction, Basic Hydrologic Concepts
2	From Dingman Section 3.2	18, 20 Jan (Mon MLK Day)	Basic concepts con't; the global water cycle
3	Dingman Sections 4.1, 4.5	23, 25, 27 Jan	Precipitation
4	From Dingman Chs 6 and 7; start Ch 9	30 Jan, Feb 1, 3	Infiltration and Evapotranspiration
5	Dingman Ch 9	6, 8, 10 Feb	Stream Processes
6	Midterm 1: Mon Feb 13. Readings: Handouts	13, 15, 17 Feb	Physical and Chemical Weathering
7	Handouts, Fetter Ch 9 (Dingman Appendix B)	20, 22, 24 Feb	Chemical weathering; basic aqueous geochemistry
8	Handouts	27, 29 Feb, 2 March	Erosion and Sediment Transport
9	--	5-9 March	---- Spring Break ----
10	Dingman Ch 8/Fetter Ch 3	12, 14, 16 March	Hydraulic properties of rocks and sediments
11	Midterm 2: Mon March 22. Readings: D. Ch8/F. Ch 4	19, 21, 23 March	Hydraulic head, Darcy's Law
12	Dingman Ch 8/ Fetter, Ch 7	26, 28, 30 March	Regional groundwater flow
13	Dingman Ch8/ Fetter, Ch 5	2, 4, 6 April	Wells and water supply
14	Fetter, Ch 10	9, 11, 13 April	Groundwater contamination
15	Dingman Ch 10, Fetter Ch 11; Start reviewing!	16, 18, 20 April	Water Supply
16		23 April	Wrap up

Final Exam Tuesday May 1, 9 am

LAB SCHEDULE

Week	Date	Lab
1	11, 12 Jan	The geography and soils of the USC campus
2	18, 19 Jan	Surveying: Creating topographic maps
3	25, 26 Jan	Surveying: Arboretum I
4	1, 2 Feb	Infiltration of water into soil
5	8, 9 Feb	Surveying: Rocky Branch and the Manning Equation
6	15, 16 Feb	Stream Hydrographs (meet in computer lab)
7	22, 23 Feb	Field trip: Liberty Hill Quarry
8	29 Feb, 1 March	Arboretum II (water table mapping)
9	7, 8 March	No lab – spring break
10	14, 15 March	Angle of Repose
11	21, 22 March	Measuring fluxes (AC Moore Garden, Rocky Branch)
12	28, 29 March	Darcy's Law: Permeameters
13	4, 5 April	Arboretum III (finish up)
14	11, 12 April	Solute transport lab
15	18, 19 April	TBA/Rain Date