UNIVERSITY OF CALIFORNIA, MERCED
Environmental Engineering Major

EnvE 183 Field Methods in Subsurface Hydrology

Fall Semester 2017
W 8:30-10:20 COB 262;
Office hours WTh 11-12
or by appointment or email

Professor Tom Harmon
Offices: SE2 Rm 120G
tharmon@ucmerced.edu
phone: 209-386-3222

Text:	(1) Tindall and Kunkel, (1999). *Unsaturated Zone Hydrology for Scientists and Engineers*, Prentice Hall 1st edition. [NOTE: free download for individual use].
Class format:	This course will include a combination of workshops, field exercises, and data analysis. Attendance and active participation is important to learning.
Course Description:	This course is designed as a first course in subsurface hydrology field methods. Students will learn about techniques for characterizing soil and aquifer sediments and for estimating stores and fluxes of water and gases in soil and groundwater. Students will gain skills in keeping field notes, analyzing and presenting data, and writing professional reports.
Course Goals:	1. Understand the fundamentals of soil physics and hydrology in the context of developing, implementing and interpreting a sampling plan. 2. Understand how to plan and execute a field experiment, how to keep a field notebook, and how to effectively collect and manage environmental data. 3. Gain skills in working effectively as a team to accomplish larger tasks more effectively. 4. Be familiar with the principles and procedures of modeling subsurface hydrology problems using modern soil flow and transport simulators. 5. Gain skills and confidence oral, written and graphical communication of environmental data.
Learning Outcomes:	At the end of the course, students should be: 1. Proficient in developing and executing environmental sampling plans. 2. Familiar with fluid hydraulic theory in the context of a real environmental system. 3. Familiar with the typical ranges of hydrologic properties of different types of geological materials (porosity, permeability, water retention) 4. Familiar with addressing subsurface hydrology questions/problems using professional simulators 5. Competent in developing and implementing experimental plans to collect and interpret subsurface hydrology data. 6. Apply effective written, oral and graphical communication skills 7. Develop field and report-writing skills individually and in team.
Homework:	Homework will be work tasks related to the class project, which will involve installing soil and weather monitoring equipment. It will be important to complete the homework in a timely and professional manner so that the project is to be completed properly during the semester.
Reports:	There will be regular reporting assignments related to data collection and data analysis, and there will be 2 formal presentation (preliminary and final). A final written report will be due during finals week.
Student Projects:	In this course, we will plan, install, maintain and analyze data from a small monitoring network for assessing soil conditions. Sudents may work together on all aspects of the project EXCEPT for the final report, which must be prepared individually.
Grades:	Course grades will be weighted as follows: Class participation 20%; Weekly task completion 20%; Preliminary presentation 10%; Final presentation 10%; **Final project report 40%.**

Academic Honesty	Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. **a.** Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. **b.** You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an e-mail attachment file, a flashdrive, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. **c.** For the final report, you must do your own work. Discussion with the instructor and classmates is encouraged, but sharing of figures and text is unacceptable. Please create your own final report.

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Fall Semester 2018 Wed 8:30-10:20 Granite Pass 155	Professor Tom Harmon Office: SE2 120-G tharmon@ucmerced.edu Office hours: TW 11-12	TA Angel Fernandez Bou Office: SE2 120-H afernandezbou@ucmerced.edu Office hours: TBD

Course Schedule

Class Meeting	Date	Topic	Reading/video
1	Aug 22	Class overview; **site walk-thru***	Tindall and Kunkel (Ch 2)
2	Aug 29	Start in class: **field notebook setup, sampling design field safety, site walk-thru with notebooks***	Tindall and Kunkel (Ch 2)
3	Sep 5	Soil core collection, moisture and potential sensors, soil water samples	Decagon: Soil Moisture 101 video SM Equipment: Soil core sampler video Decagon: Custom Soil Calibration… video
4	**Sep 12**	**Field site: field safety, walk-thru, notebook setup, sampling design**	**Keeping a field notebook**
5	**Sep 19**	**Field site*: installation**	
6	**Sep 26**	**Field site*: installation**	
7	**Oct 3**	**Field site:* soil vapor/gas measurements**	**Learn to use CO_2 monitoring units**
8	Oct 10	Soil texture, density, porosity and moisture retention estimates	SM Equip: Pressure plate, disturbed sample SM Equip: Pressure plate instruction manual SM Equip: Pressure plate, undisturbed sample
9	**Oct 17**	Soil hydraulics ROSETTA Model	Tindall and Kunkel (Ch 7 and Ch 8) USDA ROSETTA website
10	Oct 24	Soil hydraulics measurements	
11	Oct 31	Soil hydraulics measurements	
12	Nov 7	Soil CO_2 data analysis	Tindall and Kunkel (Ch 7 and Ch 8)
13	Nov 14	Data processing workshop finalizing field results	**Students present data (rough draft)**
--	Nov 21	**UCM non-instructional day**	**NO CLASS**
14	Nov 28	**Field site deconstruction***	Data/modeling workshop with leftover time
15	Dec 5	Final report (oral + visual)	**Students present final reports**
--	Dec 14	Final written report deadline	**Upload to Catcourse by **NOON Dec 14 **

*** Field work days** where we will dig, collect samples, place soils sensors in the ground and set up a weather station. We will try to complete the work within class hours, but additional time may be needed depending on weather and digging conditions. Please dress appropriately (work shoes, jeans, hats, sunscreen, etc) on these days and bring water to drink.