ENST 320a: Soil and water sustainability in the field
Units: 4

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Course Description/Rationale

Both water and soil are integral to human livelihood, and both are currently under threat. This class presents an overview of the issues related to water and soil sustainability including soil development and management, the hydrologic cycle, the cycling of nutrients through both soil and water, soil and water pollution, and food security related to soil and water issues. ENST 320a In the Field is a special section of the Water and Soil Sustainability course taught during Spring and Fall semesters on the University Park Campus. The course will be conducted on the Wrigley campus to allow enhanced research, lab and field studies.

Learning Objectives

- Students will gain in depth knowledge of water in the environment, focusing on how water moves through the environment, how humans use and interact with water, and pollution of water
- Students will explore soil science in order to understand how the physical, chemical and biological properties of soil are important to humans and the environment.
- Students will learn how soil and water quality are intimately linked and their importance for food production and security worldwide.
- Learning objectives in this course are aligned with those of the Environmental Studies Program: https://dornsife.usc.edu/environmental-studies/learning-objectives/

Recommended preparation: ENST 100

Course Notes

We will meet daily (Mon-Fri unless otherwise specified) for lectures and discussions led by the course instructor and/or a guest lecturer. After our morning meeting, we will generally discuss the day's activities and venture into the laboratory and/or the field. Throughout the course, students will work together in pairs or groups of complete activities. Occasionally, course plans will necessitate the course will continue into the evening where for discussion and analysis of laboratory and/or field data (likely for some lab-work days while at WMSC).

This course will use Blackboard for communication, information and turning in assignments. Lecture slides will be made available after the lecture is given. Additional readings will be assigned throughout the semester and be announced in class and posted on Blackboard. Sometimes computers will be used in class to work with data in spreadsheet programs or other software. This course involves in depth reading and critical analysis outside of lecture.

Required Texts:

1. Pennington, Karrie L. and Cech, Thomas V. (2005), Introduction to Water Resources and Environmental Issues, 457 pp., Cambridge. Referred to below as WREI.
2. Brady, Nyle C. and Weil, Raymond R. (2010). Elements of Nature and Properties of Soils, Pearson. Third ed. Referred to below as ENPS

Description and Assessment of Assignments

You will be graded on the basis of your performance on exams, written assignments, group presentations, and in-class activities (e.g., study guide discussions, Blackboard assignments, etc.). Lecture presentations will be posted on Blackboard after the lectures. Exam questions will be drawn from course readings, lecture materials, and discussions.

If there is a conflict with an exam, you must email the instructor 2 weeks in advance to see if alternative arrangements can be made (under reasonable circumstances). Otherwise, **make-up exams will not be given, except in extreme emergencies**. If a student misses an exam and/or assignment due to an unexcused absence, they may receive a zero for that portion of the course. Make-up exams will also be more difficult, so it is in your best interest to take the exam on the day it is scheduled. If you have an emergency on exam day, you must get in touch with instructor before the exam if possible.

During exams, students will NOT be allowed to have notes, books, cell phones, etc. Only your laptop, pens/pencils and a calculator are required. Failure to comply with exam policies will automatically result in a grade of "0" for that particular exam.

Reading guides will involve reading primary literature, answering questions outside turning them in ahead of the scheduled class session (due dates, or any deviation from this plan will be announced in person and via Blackboard), and discussion of the reading in class, and will be assessed for completeness.

Students will independently write summary reports based on the lab exercises we will conduct. Lab report guidelines will be made available on Blackboard. The purpose of the lab reports is to practice analysis, synthesis and interpretation of data. All submissions will be evaluated for accuracy and thoroughness of research, attention to detail, and quality of finished project.

Assignments will not be accepted late.

Grading Breakdown

Assignment	% of grade
Exam 1	16%
Exam 2	16%
Soil lab report	12%
Water quality lab report	12%
Group project	16%
Reading guides	14%
In class activities	14%

Final grades based upon the following thresholds (*may be adjusted based upon class progress*):

Grade	Percent		Grade	Percent
A	> 94		*C*	> 73
A-	> 90		*C-*	> 70
B+	> 87		*D+*	> 67
B	> 83		*D*	> 63
B-	> 80		*D-*	> 60
C+	> 77		*F*	59 and below

Additional Policies

Routine attendance and active participation are an important part of each class session. For the best learning experience, you are expected to have read the course materials assigned for class sessions. You are responsible for information, announcements, date changes, and any other course material presented, regardless of your participation in the classroom. This course will also have a significant lab portion. It is important that you are prepared for lab by reading protocols and any other materials before lab.

If there is a conflict with an exam, you must email the instructors *2 weeks in advance* to see if arrangements can be made (under reasonable circumstances). Otherwise, make-up exams will not be given except in extreme emergencies.

Additionally:

- Come to class prepared
- Be respectful of instructor and other students in class
- Please leave cell phones outside the classroom or turned off
- If you have to miss class make sure you arrange to get notes and announcements.

Course Schedule

This course uses an intensive learning format to complete the equivalent of a 15-week, 4-unit course (minimum, 50 contact hours) based upon the following six-day per week course schedule:

- Monday-Friday morning lecture and discussion sessions, ~2 h (10 h per week, 30 over course)
- Afternoon sessions that include field trips during week 1 (2 trips x ~5 h) and 3 days of afternoon field/laboratory studies during week 2-3, on Catalina Island (3 x ~5 h).
- Saturday morning exams

For the best learning experience, read assigned material by the date it is discussed in class. Articles, reading guides and other supplemental resources will be made available via Blackboard. Schedule may be adjusted throughout the semester depending on class progress.

Discussions/reading guides in bold. *Field trips, field sampling and laboratory experiences italicized*

Week 1

Date	Lecture and lab/afternoon activities	Associated Readings
17 Jul	Miss Christi to WIES (leaves San Pedro 7:30am); housing, lab, etc. orientations; set up lab space; hike	
18 Jul	Introduction, Water as a chemical, hydrologic cycle *Form groups and research topics for final presentations*	WREI: Ch. 3 ENPS: Ch. 6 also helpful
19 Jul	Water supply and watersheds	See Bb
10 Jul	Water allocation and rights	

21 Jul	**Reading guide and discussion: Grant et al, Taking the waste out of wastewater** *Afternoon: Digital watershed analysis tools (WPH 104)*	WREI: Ch. 5

Week 2

Date	Lecture and lab/afternoon activities	Associated Readings
24 Jul	*Morning field trip and workday:* *8:30 AM meeting with Megan Wong, Better Watts Initiative, Mudtown Farms*	
25 Jul	Afternoon classroom session (~1PM): Water dynamics of surface and subsurface, groundwater contamination	WREI Ch. 6, ENPS Ch. 5, 15
26 Jul	Soil science: development and properties; soil erosion **Reading guide/discussion: Amundson et al.,** *Afternoon field trip: Watersheds hike and sampling*	ENPS: Ch. 1, 2, 14 (14.1-14.3, 14.11, 14.13) See Bb
27 Jul	Soil science: damage, sustainability, Soil salinity and pH *Study for midterm*	ENPS: Ch. 4 (4.1-4.5, 4.7, 4.8), Ch. 9 (9.1-9.3, 9.6, 9.7, 9.12-9.16, 9.18, 9.19)
28 Jul	**Exam 1: 10AM**	

Week 3

Date	Lecture and lab/afternoon activities	Associated Readings
31 Jul	Miss Christi to WIES (leaves San Pedro 7:30am); housing, lab, etc. orientations; set up lab space; hike	
1 Aug	Morning: *Soil sampling field excursion and start analyses-Soil sampling, soil texture, Eh, nutrients, pH, respiration* *Tour and discussion of student project with Lauren Oudin, WMSC Assoc. Director for Sci. Operations* Afternoon: *Soil lab-Grain size analysis and soil porosity analysis*	Soil manual and (See Bb) ENPS Ch. 6 helpful
2 Aug	Morning: Approaches to water sustainability, constructed wetlands Afternoon: *Continue/complete soil lab*	ENPS: Ch 14 (14.7-14.10)
3 Aug	Morning: *Finish up lab, Data analysis and discussion* Afternoon: *Guided snorkel*	See Bb
4 Aug	Morning: Kayaking Afternoon: Wetlands, Carbon cycle **Reading guide/discussion: Barbier, Valiela, Wetland value**	WREI Ch 9, Ch. 11 (11.4-11.8, carbon section) See Bb
6 Aug	Morning: Group project work and update meetings *Soil lab reports due: 5PM*	

Week 4

Date	Lecture and lab/afternoon activities	Associated Readings
7 Aug	Morning: *Guest lecture and demo***:** Anna Wilson, Scripps Afternoon: Nitrogen Cycle, Phosphorus cycle After Dinner (645PM): Hyperbaric chamber tour	ENPS: Ch. 12 (12.1, 12.3, 12.4)
8 Aug	Morning: Water usage, treatment, and quality Afternoon: *(Tentative) Water quality and nutrients: sample collection and sensors, Cat Harbor and Two Harbors water sampling*	WREI: Ch. 11, 12
9 Aug	Morning: Coastal pollution and eutrophication *10AM Randy Phelps water treatment overview and system tour* Afternoon: *Water quality and nutrients: phosphate measurements*	*DIP method (see Bb)*
10 Aug	Morning: Food security/Conservation agriculture Afternoon: *Data analysis and discussion* *Lab reports due*	ENPS: Ch. 12 (water erosion) See Bb video
11 Aug	Project wrap up Depart Catalina, Two Harbors on Catalina Express (estim. 4:30 PM)	

Statement for Students with Disabilities:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to your course instructor prior to the trip. DSP is located in STU 301.

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Academic and Student Support Systems

Counseling and Mental Health - (213) 740-9355 – 24/7 on call; studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call; suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call; studenthealth.usc.edu/sexual-assault. Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298; equity.usc.edu, titleix.usc.edu. Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298; usc-advocate.symplicity.com/care_report. Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776; dsp.usc.edu. Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710; campussupport.usc.edu. Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101; diversity.usc.edu. Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call; dps.usc.edu, emergency.usc.edu. Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call; dps.usc.edu
Non-emergency assistance or information.