

ENST 320a: Water and Soil Sustainability

Units: 4

Fall 2021, TTh 9:30-11am

Section: 33021

Location: WPH 102

Instructors:

Dr. Jill Sohm (she/her)

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Course description

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. *Recommended preparation: ENST 100*

Classroom ground rules

- Share responsibility for including all voices in a conversation
- Listen respectfully to your classmate's and your instructor's viewpoints
- Be open to changing your perspectives based on what you learn from others
- Understand that we are bound to make mistakes in this space
- Understand that your words have effects on others
- Take group work during class and outside of lecture seriously
- Understand that your classmates may have different experiences from your own
- Make an effort to get to know your classmates
- Understand that there are different approaches to solving problems

Learning Objectives

- Students will gain 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/>

Return to in-person instruction

All members of the USC community (faculty, students, staff) must be able to demonstrate proof of compliance with Trojan Check, which includes compliance with the university's vaccination policy, as well as completion of the university's recently relaunched Hygiene Health and Safety Training in order to access campus. As such, masks must be worn at all times (as per USC policy) inside (e.g., classrooms, offices, etc.). **Students are expected to comply with all aspects of USC's COVID-19 policy.** Failure to do so may result in removal from the class and referral to Student Judicial Affairs and Community Standards.

Course overview

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 may be assigned periodically throughout the semester, and these will be announced in class, posted on Blackboard and via email messages sent to the class. During some lectures, we will work with spreadsheet data (using Excel; see [link](#) for tutorial) and run simple simulations or experiments as a class and/or asynchronously (see course schedule for specific dates). This course involves a lot of in depth reading and critical analysis outside of lecture.

Required readings and supplementary materials

1. Pennington, Karrie L. and Cech, Thomas V., Introduction to Water Resources and Environmental Issues, 457 pp., Cambridge. **Referred to below as WREI**
2. Brady, Nyle C. and Weil, Raymond R., Elements of Nature and Properties of Soils, Pearson. **Referred to below as ENPS**
3. Selected primary literature articles: Available online via Blackboard.

Description and assessment of assignments

You will be graded on the basis of your performance on exams, written assignments, class activities and class participation (e.g., study guide discussions, Blackboard assignments, etc.). Exam questions will be drawn from course readings, lecture materials and any related assignments, activities and discussions. Each exam will cover the lecture and material immediately after the preceding exam (or starting on the first day of class for Exam 1). The Final Exam is partially cumulative and will include ~20% of material covered in the first two-thirds of the course; the remaining ~80% of the Final Exam will include only material covered after the second midterm (the last third of the course).

If there is a scheduling conflict with an exam, assignment or activity you must notify the instructors via email at least two-weeks in advance to see if alternative arrangements can be made. **Otherwise, no make-up exams will be allowed.** If a student misses an exam, assignment or activity they will receive a zero for that portion of the course. Exams may be administered either in-person or via Blackboard (specific details will be released by each instructor closer to the date on the course schedule). During exams, students are NOT allowed to use notes, books, mobile devices, etc. Failure to comply with exam policies will automatically result in a grade of "0" for that particular exam. (Midterm 1, 2 & Final; **325 total**). Failure to comply with exam policies will result in a zero for that particular exam and/or assignment.

Late assignments will have 15% deducted each 24 hours, with the first 24 hour deduction starting 30 min after the deadline. Regarding missed class activities: If you cannot make it to a class, you will need to let the instructors know prior to the start of a class. If it is an excused absence (official USC travel, medical excuse, etc.), then we will provide you with an alternative way to obtain the associated activity points outside of class.

Overview of graded course work:

- **Article analysis:** Approximately 0.5-1 page article summary (single spaced) from either the primary or secondary literature, which is based on a topic covered in class. Each student will critically read a given article and provide written answers to questions (available online), which they will then submit via Bb. Students will discuss their findings during class on the day each assignment is due. Six separate article summaries are scheduled over the course of the semester (4 x 5 pts each; **20 pts total**).
- **Problem sets:** Short problem sets to help reinforce material throughout the semester, mostly emphasizing quantitative skills (4 x 5 pts each; **20 pts total**).
- **Soil analysis:** Students will analyze a set of soil data with Excel and submit a brief write up at a later date. The write-up will include comment on the health of these soil data based on what we have learned in class. (**25 pts total**).
- **Semester Project: Rethinking the Toilet:** The flush toilet has revolutionized modern life. Yet, those of us lucky enough to benefit from the innovation hardly give it a second thought once we exit the restroom. This ability not to worry over or consider where our excretions end up is a luxury not afforded to a huge portion of the world's population. Though great strides have been made in the last twenty years, a 2019 WHO report estimates some 2 billion people still lack access to even basic sanitation services. Despite the near miraculous benefits of flush toilets and centralized wastewater treatment, in the face of environmental challenges like climate change-induced mega droughts, eutrophication, and dwindling phosphorous reserves, many have begun to wonder if there isn't a better way to dispose of and treat human waste. Our semester project will use USC as a microcosm for rethinking the flush toilet. This project will involve four assignments, culminating in a final write-up on a chosen alternative and what is needed for implementation of it (4 x 25 pts: **100 pts total**).

Grading Breakdown:

Assignment	Points	Grade Percent
Exam 1	100	20.4%
Exam 2	100	20.4%
Final	125	25.5%
Soil analysis	25	5.1%
Reading guides (4 x 5pts)	20	4.1%
Problem sets (4 x 5 pts)	20	4.1%
Semester project (4 x 25 pts)	100	20.4%
TOTAL	490	100%

Grading Scale

Final course grades will be determined based on the percentage of points earned as outlined below: >93 = A; 90-92 = A-; 87-89 = B+; 83-86 = B; 80-82 = B-; 77-79 = C+; 73-76 = C; 70-72 = C-; 67-69 = D+; 63-66 = D; 60-62 = D-; <59 = Fail. This scale may be adjusted depending on the progress of the class. If course taken as a "Pass" grade student must earn a C- or greater in course (scores at or below a D+ grade = "No Pass").

Additional policies

Routine attendance and active participation are an important part of each class session. Participation will be evaluated via thought exercises, reading assignments and in-class questions. You are responsible for information, announcements, date changes and any other course material presented, regardless of your participation and presence in the classroom. For the best learning experience, you are expected to have read the assigned material by the date it is discussed in class. Articles, supplemental readings and in-class data sets will be posted online. Finally...Come to class prepared; Be respectful of the instructors and other students in class; Please turn cell phones off; and, if you have to miss class make sure you arrange to get notes and announcements.

Course Schedule: A Weekly Breakdown

The readings and schedule of topics may be adjusted throughout the semester depending on progress of the class.

	Topics/Daily Activities	Instructor	Readings	Due Dates
Aug 24	Water as a chemical <i>Intro to "rethinking the toilet" project</i>	JS/DG	See Bb	
Aug 26	Hydrosphere & hydrologic cycle	JS	WREI Ch 3	
Aug 31	Watersheds & water supply <i>In class excel exercise: drainage/water vol.</i>	JS	WREI Ch 5	
Sep 2	Watersheds & water supply	JS	WREI Ch 5	Prob. set 1 (Google earth watersheds)
Sep 7	Watersheds & water supply	JS	WREI Ch 11, 12 See Bb	
Sep 9	Water usage & treatment	JS	WREI Ch 11, 12	"Toilet" module 1
Sep 14	Water usage & treatment Article discussion (Larsen)	JS		Article analysis 1
Sep 16	Microbiology & Fecal Indicator Bacteria <i>"Toilet" module 2 discussion</i>	JS	USGS FIB (see Bb)	
Sep 21	MIDTERM 1	JS		
Sep 23	Soil development & properties	DG	ENPS Ch. 1-2, Ch. 4 (4.1-4.5, 4.7, 4.8), Ch. 11 (11.4-11.8), 14 (14.1-14.3, 14.11, 14.13)	
Sep 28	Soil development & properties Article discussion (Amundson)	DG	ENPS Ch. 1-2, Ch. 4 (4.1-4.5, 4.7, 4.8), Ch. 11 (11.4-11.8), 14 (14.1-14.3, 14.11, 14.13)	Article analysis 2 Prob. set 2 (see Bb)
Sep 30	Soil pH and salinity	DG	ENPS Ch. 9 (9.1-9.3, 9.6, 9.7, 9.12-9.16, 9.18, 9.19)	
Oct 5	Microbes & soil food webs	DG	ENPS Ch. 10	"Toilet" module 2
Oct 7	Soil data analysis (Excel)	DG	Bring computer to class	
Oct 12	Surface & subsurface water dynamics	DG	ENPS Ch 5, 6; WREI Ch 6	
Oct 14	Fall Recess – NO CLASS			
Oct 19	Surface & subsurface water dynamics Article discussion (TBA)	DG	ENPS Ch 5, 6; WREI Ch 6	Prob. Set 3 (see Bb)
Oct 21	Guest speaker: TBA	DG		Soil data analysis
Oct 26	MIDTERM 2	DG		
Oct 28	Groundwater Contamination	JS	ENPS Ch 5, 6; WREI Ch 6	
Nov 2	Nutrient cycles <i>Discossuion of alternatives in assignment</i>	JS	ENPS Ch 11, 12, 13	"Toilet" module 3
Nov 4	Nutrient cycles Article discussion (Daneshgar)	JS	ENPS Ch 11, 12, 13	Article analysis 3
Nov 9	Agriculture & food security	JS	See Bb	
Nov 11	Agriculture & food security	JS	See Bb	Prob. Set 4 (soil eros.)
Nov 16	Wildcaught & aquaculture fisheries	DG	See Bb	

Nov 18	Coastal pollution and eutrophication Article discussion (TBA)	DG	See Bb	Article analysis 4
Nov 23	Coastal pollution and eutrophication	DG	See Bb	
Nov 25	Thanksgiving – NO CLASS			
Nov 30	Estuaries & wetlands	DG	WREI Ch. 9	
Dec 2	<i>FINAL REPORT DISCUSSION</i>	DG/JS		Final report on toilet project
Dec 9	FINAL EXAM: 11AM-1PM	DG/JS		

Statement on Academic Conduct and Support Systems

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.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. studenthealth.usc.edu/counseling

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. studenthealth.usc.edu/sexual-assault

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298

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. equity.usc.edu, titleix.usc.edu

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

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. usc-advocate.symplicity.com/care_report

The Office of Student Accessibility Services - (213) 740-0776

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. osas.usc.edu

USC Campus Support and Intervention - (213) 821-4710

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student. campussupport.usc.edu

Diversity at USC - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and resources for students. diversity.usc.edu

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

Non-emergency assistance or information. dps.usc.edu