

ENVS 477/577: Soil Science (4 cr)

Instructor: John Yeo

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Office Hours: Tuesday and Thursday 10:30am-12pm 244 Columbia Hall

Texts: *Elements of the Nature and Property of Soils*, 3rd edition. (2010) Nyle C. Brady and Ray R. Weil, Prentice Hall.

Grass, Soil, Hope. 2014. Courtney White, Chelsea Green Publishing.

See companion website: <http://www.prenhall.com/brady/>

Lecture: T,R 12:00-13:50 Columbia Hall 142;

Lab R 1400-1550 Columbia Hall 142

Prerequisites: General Chemistry (Chem 221-223 or equivalent)

Course Description

This course will introduce students to the wonderful world of soils that lie, often forgotten, beneath your feet every day. Soils are one of the most fundamental ecological constraints on such things as plant distributions and the productivity of both natural and managed ecosystems. Soils are also an important component of many current and historical environmental problems.

For Environmental Science majors, this course satisfies an upper division elective (Area 3A) in natural sciences. It is also widely applicable to graduate and undergraduate students in Biology, Geography, Geology, Anthropology, and Landscape Architecture, along with other majors on campus.

The course involves a mixture of lecture and experiencing soils first hand in the lab and field. Scheduled are two 2-hour lectures per week, one 2-hour lab per week, and a weekend day trip. The lab is scheduled immediately after class in the late afternoon, and we will use this entire block of time occasionally to sample soils in local field sites.

Learning Outcomes:

The objectives of this class are to have students:

- Understand the physical, chemical, and biological aspects of soils,
- Be able to accurately identify and describe important soil physical characteristics in field settings.
- Describe soils according to the USDA soil taxonomic system, and interpret soil properties based on taxonomic names.
- Understand the mechanisms of soil formation (pedogenesis) across varying landscapes.

- Recognize the fundamental role soils play in environmental problems, and the limits that soil degradation places on society.
- Understand soil management paradigms for ecosystem restoration and carbon sequestration.

The classroom portion of this class is lecture based delivered at a relatively rapid pace via PowerPoint. Detailed PowerPoint slides will be put on Blackboard at least 24 hours before lecture. I will also print them and give them as handouts before every lecture.

Attendance is required for lecture, lab, and field trips. Three unexcused absences from lecture or lab within a term will result in your grade being reduced by one-third letter grade, and each additional unexcused absence will result in a similar reduction your grade. *You will need to drop the class if you cannot make the weekend field trip.*

Grading Criteria

Students will be evaluated based upon attendance, a midterm, a final, two comprehensive lab reports, and an essay on *Grass, Soil, Hope*. The final exam will cover material since the previous test and is NOT comprehensive.

Students enrolled in ENVS 577 will have one additional assignment based on an oral presentation that each student will give once throughout the quarter. These presentations will be given on Tuesdays of every week as responses to consultant request letters, through which students are asked to respond to specific soil management issues, addressing (a) what further questions should be asked about the soil issue, (b) what data is needed and how it would be obtained, and (c) potential management strategies. Dates for these presentations will be arranged during the first week of class.

Grades and overall evaluation of student performance will be based on course activities in the following proportions:

ENVS 477

Lab Quizzes – 10%
Lab/Field Reports – 30%
Mid-term exam - 25%
Essay – 10%
Final exam - 25%

ENVS 577

Lab Quizzes – 10%
Lab / Field Reports - 30%
Letter presentation – 10%
Mid-term exam - 20%
Essay – 10%
Final exam - 20%

Early Final Examinations (Quoted from UO website)

Final examinations must be given during the scheduled final examination period. Faculty legislation prohibits the early administration of final examinations. Final examination week is considered to be a part of the regular term, and to end the term prior to its scheduled date reduces instructional days to which students are entitled.

Labs and Field Trips

Promoting hands-on learning about soils by students is an important component of this class. We'll occasionally use some or all of the lecture time on Thursdays for labs and field trips. Labs will be used to do an extensive physical description of the soil horizons from each field site. A comprehensive lab report will be due in two parts. The first part will describe the horizons and the landscape setting of soils sampled up to that point. It will also include a soil map of each site downloaded from the soil mapper program on the Natural Resources Conservation Service website. The second part will include the same for the remainder of the soils sampled along with an overall assessment of how the five state factors introduced in class describe the distribution of soils within this part of Oregon. Students will work in teams in the lab and may share data, but *ALL writing must be their own for the lab reports*. Field trips happen irrespective of the weather and will involve digging in the soils, so bring appropriate clothing and shoes.

There is a mandatory field trip on Saturday, Oct. 25. Place this on your calendars now.

If a student misses a field trip because of sickness, it will require a written doctor's message verifying the severity of the sickness. Missed all-day field trips will require a 5-pg. single-spaced report on a topic to be assigned by the instructor.

Students should read lab materials before coming to lab each. **Lab quizzes will be held at the beginning of each lab, and will include questions about the upcoming lab, and also results / conclusions of the previous lab.**

Academic Dishonesty and Other Matters

You are expected to follow University rules and guidelines for behavior. *Academic dishonesty*, which includes cheating and plagiarism, is a serious offense and will be treated according to the guidelines in the Student Conduct Code (see Office of Student Life website).

Plagiarism is the inclusion of someone else's product, words, ideas, or data as one's own work. When a student submits work for credit that includes the product, words, ideas, or data of others, the source must be acknowledged by the use of complete, accurate, and specific references, such as footnotes. Expectations may vary slightly among disciplines. By placing one's name on work submitted for credit, the student certifies the originality of all work not otherwise identified by appropriate acknowledgements. On written assignments, if verbatim statements are included, the statements must be enclosed by quotation marks or set off from regular text as indented extracts.

A student will avoid being charged with plagiarism if there is an acknowledgement of indebtedness. Indebtedness must be acknowledged whenever:

- 1. one quotes another person's actual words or replicates all or part of another's product;*
- 2. one uses another person's ideas, opinions, work, data, or theories, even if they are completely paraphrased in one's own words;*

3. *one borrows facts, statistics, or other illustrative materials--unless the information is common knowledge.* (UO Policy on Academic Dishonesty, <http://tep.uoregon.edu/workshops/teachertraining/learnercentered/syllabus/academicdishonesty.html>)

Crises happen. If you are having problems that are interfering with your ability to do the work in this class, please let me know promptly. I am willing to make special arrangements when the need is real and when you have done your best to deal with the situation in a timely manner.

Disabilities: The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

Useful Web Links

- Glossary of soil science terms: <https://www.soils.org/publications/soils-glossary>
- Soil taxonomy in the U.S., keys and maps: <http://soils.usda.gov/technical/classification/taxonomy/>
- Description and distribution maps of soil orders: <http://soils.cals.uidaho.edu/soilorders/index.htm>
- Official soil series descriptions: <http://soils.usda.gov/technical/classification/osd/index.html>
- Natural Resources Conservation Service homepage: <http://www.nrcs.usda.gov/>
- Soil Science Society of America: <https://www.soils.org/> (Professional society of 6,000+ members whose goal is to advance soil science.)
- Soil biological communities, informative website about the abundant life in soil, run by National Science and Technology Center and Bureau of Land Management: <http://www.blm.gov/nstc/soil/index.html>
- Pedosphere.com is an extensive repository of soil science knowledge through partnerships with major international organizations and also be an active player in global Soil Science education by creating high quality, interactive resources that engage both students and instructors: <http://www.pedosphere.com/>
- Smithsonian Soil Exhibit: <http://www.soils.org/smithsonian/>
- Soil Science Education: <http://soil.gsfc.nasa.gov/>
- International Union of Soil Scientists: <http://www.iuss.org/>
- World Soil Resources <http://soils.usda.gov/use/worldsoils/>

Syllabus

Week	Date	Lecture	Text Reading*	Notes
1	9/30	The Wonderful World of Soils	Ch. 1	
1	10/2	Physical Properties	Ch. 4	No lab
2	10/7	Physical Properties		
2	10/9	Soil Formation (Pedogenesis)	Ch. 2	Lab: Introduction to field description of soils. Print and bring **.
3	10/14	Soil Formation (Pedogenesis)		
3	10/16	Local Field Trip During Class and Lab Time		
4	10/21	Soil Formation (Pedogenesis)		
4	10/23	Soil Classification	Ch. 3	Normal lab
4	10/25	MANDATORY WEEKEND FIELD TRIP		
5	10/28	Soil Classification / Alan Savory TED Talk		
5	10/30	Mid-Term		Normal lab
6	11/4	Soil Classification		
6	11/6	Local Field Trip During Class and Lab Time		
7	11/11	Web exercise from NRCS website Soil Water	Ch. 5-7	
7	11/13	Soil Water		Normal lab, First Part of Lab Report Due
8	11/18	Properties of Secondary Soil Minerals	Ch. 8	
8	11/20	Properties of Secondary Soil Minerals		Normal lab
9	11/25	Soil Acidity, Alkalinity, & Salinity	Ch. 9	
9	11/27	Thanksgiving—Happy Feasting!		
10	12/2	Soil Erosion	Ch. 14	
10	12/1	Dirt: the Erosion of Civilizations by Montgomery. Class discussion		5 pg. essay due on Grass, Soil, Hope; Last Part of Lab Report Due
Wednesday 12/10		Final, 8:00 AM		
Field trips happen no matter the weather, so be prepared!				
*From Brady and Weil unless otherwise noted.				
**Ch. 4 of Manual for Judging Oregon Soils & pp. 103, 124 of Brady and Weil.				

Year	Month	Day	Event	Location	Notes
1998	10	10
1998	10	11
1998	10	12
1998	10	13
1998	10	14
1998	10	15
1998	10	16
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1998	10	30
1998	10	31