



**Instructor:** Lucas Silva, [lsilva7@uoregon.edu](mailto:lsilva7@uoregon.edu)

**GE:** Schyler Reis, [schylerr@uoregon.edu](mailto:schylerr@uoregon.edu)

Office Hours: Friday 2:00 – 3:00 or by appointment, room 247 Columbia Hall

**Lecture:** 12:00 - 1:50 pm Wednesday. Room 142 Columbia Hall

**Lab:** 12:00 - 1:50 pm Friday. Room 142 Columbia Hall

**Field Trip:** Field trip Saturday October 14<sup>th</sup>  
Depart 8:00 am Onyx Bridge Parking Lot, Return 6:00 PM

**Website:** <https://canvas.uoregon.edu/courses/78623>

### Texts and Additional Reading

- *Elements of the Nature and Property of Soils*, 3<sup>rd</sup> edition. (2010) Nyle C. Brady and Ray R. Weil, Prentice Hall. Several copies are available at the Science Library and two copies are reserved at the ENVS office. Also, check on line for affordable new or used copies online. The 2nd edition of the book is also acceptable, if you can find used copies.
- *Dirt: The Erosion of Civilizations*. (2007) David R. Montgomery, Univ. of California Press. Several copies are available at the library and one copy is reserved at the ENVS office.
- *Manual for Judging Oregon Soils* (see attached PDF on Canvas)
- Additional Reading will be assigned via Canvas.

### Course Description

This course will introduce undergraduate and graduate students to the wonderful world of soils. Soils exert fundamental control on patterns and processes of plant distributions, nutrient and water cycling, 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 Anthropology, Biology, Earth Sciences, Geography, and Landscape Architecture, along with other majors on campus. This course is open to undergraduate juniors and seniors who have completed a general chemistry sequence (CHEM 221-223, 224-226H or equivalent).

### Learning Outcomes

Upon successful completion of this course, you should:

- Understand basic physical, chemical, and biological aspects of soils;
- Be able to describe important soil characteristics in field and laboratory settings;
- Be familiar with the USDA soil taxonomic system and able to interpret soil properties based on taxonomic names.
- Understand the mechanisms of soil formation (pedogenesis) across varying landscapes.
- Recognize the fundamental role soils play in local and global environmental problems, and the constraints that soil degradation places on society.

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- Understand soil management paradigms for ecosystem restoration and carbon sequestration.

### Course Format

The course involves a mixture of lecture and first-hand soil examination in lab and field settings, including approximately 2-hour lectures per week, 2-hour lab activities per week, and one weekend day field trip. The classroom portion will be primarily lecture-based delivered at a relatively rapid pace via PowerPoint (slides will be available on Canvas) and should be supplemented by the assigned readings. We will begin the course with the fundamentals of soil science, apply this knowledge to define and characterize properties of important soil types, and then address complex environmental problems pertinent to soil science (e.g., fertility, salinization, erosion). Please ask questions during lecture if a concept is unclear. Occasionally, you will also have primary literature assigned that will be discussed during class time. This is a chance to enhance your critical thinking skills by interacting with the primary literature, your colleagues, and the instructor. Additionally, you will complete weekly assignments about fundamental concepts in soil science that will give you another chance to exercise your critical thinking and writing skills.

### TENTATIVE SCHEDULE

Week	Date	Lecture/Exams	Reading	Notes
1	9/27	The Wonderful World of Soils	Ch. 1*	
1	9/29	Physical Properties		Lab: Introduction to field description of soils**
2	10/04	Physical Properties	Ch. 4*	
2	10/06	Soil Formation (Pedogenesis)		Lab: Soil Physical Properties Ch. 1-3 Dirt summary due***
3	10/11	<b>Field Visit UO Farm</b>		<b>Meet in 142 Columbia</b>
3	10/13	Soil Formation (Pedogenesis)	Ch. 2*	
3	10/14	<b>Field Trip To be Determined</b>		<b>Meet in 142 Columbia**</b>
4	10/18	Soil Formation & Classification	Ch. 3*	
4	10/20	Soil Classification		Lab: Soil Survey / Organic vs mineral soil properties Ch. 4-5 Dirt summary due***
5	10/25	Review Session		
5	10/27	<b>Midterm 1</b>		<b>NO LAB</b>
6	11/1	Allan Savory TED Talk & Soil Water	Ch. 5-7*	
6	11/03	Soil Water		Lab: Soil Water Ch. 6-7 Dirt summary due***
7	11/08	Soil Colloids	Ch. 8*	
7	11/10	Nutrient Cycling		Lab: Soil Chemistry
8	11/15	Soil Fertility & Plant Nutrition	Ch 12/14*	
8	11/17	Vignettes of Graduate Research 1		Ch. 8-9 Dirt summary due***
9	11/22	Vignettes of Graduate Research 2		
9	11/29	<i>Dirt: the Erosion of Civilizations</i> by Montgomery. Class discussion		Ch. 10 summary and final essay due on Dirt reading***
10	12/1	<b>Midterm 2</b>		Not Cumulative

\*From Brady and Weil, other reading will be posted to Canvas.

\*\*Study Manual for Judging Oregon Soils & pp. 103, 124 of Brady and Weil.

\*\*\*Dirt summaries should be submitted to the GE via email before midnight on the due date.

Course schedule is subject to change. Any changes will be announced in advance during class and on Canvas.

### Expectations and Grading Criteria

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There will be no grade down for missed lectures, but active participation and discussion during lectures will greatly enhance your learning experience. Students are expected to attend all labs and field trips and your grade might be increased by up to half a letter for exemplary participation. **You are responsible for class-related work missed as a result of an absence** - this work may be made up at the instructor's discretion. All students will be evaluated based upon participation, weekly lab quizzes and lab reports, one field report, two non-cumulative midterms, biweekly chapter summaries and a final essay on *Dirt: The Erosion of Civilizations*. **10% will be deducted each day an assignment is late.**

Evaluation of performance will be based on course activities in the following proportions:

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Lab Quizzes – 10%	A+ = > 97%, A = 92.5 – 97%
Lab/ Field Reports – 35%	A- = 89.5 – 92.5%, B+ = 87.0 – 89.5%,
Mid-term exams – 40%	B = 83.0 – 87.0%, B- = 79.5 – 83.0%
Dirt essays – 15%	C+ = 77.0 – 79.5%, C = 73.0 – 77%
	C- = 69.5 – 73.0%, D = 59.5 – 69.5%

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\*In addition, graduate students will be evaluated based upon presentation of soil science research vignettes on Nov 24<sup>th</sup> and 29<sup>th</sup>.

### Labs and Field Trips

Labs will be used to examine soil horizons from field sites and to provide other hands-on opportunities to interact with course material. Lab and field guides will be posted on Canvas by Monday of each week. You are expected to have read through the guide for that day and completed any pre-lab/field assignments detailed in the guide. Students will work in teams in the lab and may share data, but **all writing must be their own for the lab reports**. There is **one mandatory field visit to the experimental farm on campus and one mandatory trip on Saturday, October 14<sup>th</sup>**. Field trips happen irrespective of the weather and will involve digging in the soils, so bring appropriate clothing and shoes. Lab quizzes will be held at the beginning of most labs, and may include questions about the upcoming lab, and also results / conclusions of the previous lab. Place this on your calendars now!

**Crises** happen. If you are having problems that are interfering with your ability to do the work in this class, let the instructor know as soon as possible. Special arrangements can be made when the need arises if you have done your best to deal with the situation in a timely manner.

### Academic integrity and Diversity

All students are expected to complete assignments and exams in a manner consistent with academic integrity. This means that **you must produce original work and cite all relevant sources for ideas, quotations, etc.** Academic dishonesty is a serious offense and will be treated according to the guidelines in the Student Conduct Code. Moreover, I expect students to adhere to the University's commitment to freedom of thought and expression of all its members by encouraging open inquiry and respecting a diversity of opinions in this course. Please refer to the Student Conduct Code for more information on the University's Academic Dishonesty Policy and Diversity Education: <http://uodos.uoregon.edu/>

### University of Oregon's Accessible Education Center

At this University we do our best to facilitate and support accessible education. If there are aspects of this course that result in barriers to your learning and participation, you should contact the instructor to discuss possible solutions. If you have special needs, such as test accommodations, note-taking, and sign language interpretation, please contact the Accessible Education Center (AEC) so that their personnel and the instructor can work together to help you learn comfortably in this class. The AEC office is located in 164 Oregon Hall. Telephone 541 346-1155. On the web: <http://aec.uoregon.edu/index.html> E-mail: [uoaec@uoregon.edu](mailto:uoaec@uoregon.edu)

### How to succeed in this class

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- Attend and participate actively in all lectures, labs and field trips.
- Ask questions.
- Learn the language. Soil science is inherently a jargon-filled discipline and to communicate effectively with other soil scientists, one must learn the terminology.
- Do the assigned reading and answer the review questions at the end of each chapter. This will reinforce concepts covered in lecture and lab.
- Get together in small study groups regularly. Go over concepts together. Try to do this without referring to the book or your notes. This will let you know where the gaps in your knowledge are. There is no better way to learn than teaching others.
- Get 'dirty'. As you walk around campus and Eugene, grab samples of soil and try to describe them using the methods we've discussed in class.
- Don't get bogged down in the details, but instead ask yourself what is the big picture and how can I apply these concepts.

### 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://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/>
- Description and distribution maps of soil orders: <http://www.cals.uidaho.edu/soilorders/>
- Official soil series descriptions: [http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/survey/class/data/?cid=nrcs142p2\\_053587](http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/survey/class/data/?cid=nrcs142p2_053587)
- 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>
- 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/>