

Environmental Pedology | SWS 4715 (Undergraduate) | SWS 5716* (Graduate)

*includes On-campus and Distance-education sections

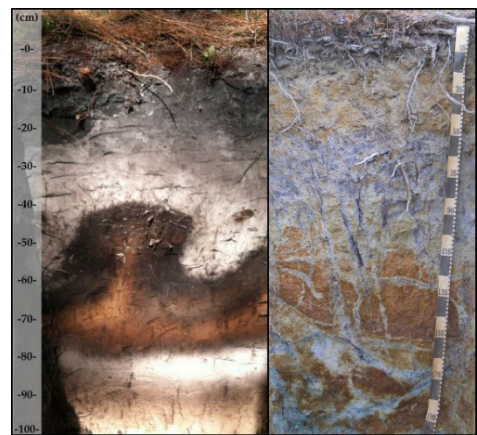
Instructor Dr. Allan R. Bacon | allan.bacon@ufl.edu
352-294-3119 (office) | G158 McCarty Hall A (office) | Office hours by appointment

Meeting Times and Places (On-campus) M & W 10:40a - 11:30a | 3194 McCarty Hall A
(On-campus) W 12:50p - 4:55p | Fieldtrips (see Appendix A below)
(Distance-education) Time TBD | Bi-weekly meetings (every two weeks) via Zoom

Class Motto *"I don't know much about ecology, but ecosystems, I know a lot."* – Hans Jenny

Class Song My Best Teacher - by The Grouch (a.k.a. Corey Scoffern)

Course Overview Processes of soil formation shape all of Earth's terrestrial surface. These processes govern how and why soil is distributed across landscapes, control hydrology, determine how well (or not well) suited an area is for specific management activities / environmental services, and provide a habitable media for organisms of all sizes including higher plants. Because soil formation operates over diverse timescales (from decades through geologic time) and results from high level interactions between humans and all of Earth's spheres (the lithosphere, biosphere, hydrosphere, and atmosphere), unraveling these processes is a supremely challenging interdisciplinary endeavor. Here, you'll learn to "read" the story of soil formation to decipher temporal and spatial processes on Earth surface and soil's role within larger ecosystems.



Millions of years of physical and chemical processes are recorded by the diverse colors and morphology of a Spodosol (left) and an Ultisol (right). Reading these records tells us about Earth surface processes and allows us to predict soil's role in contemporary ecosystems.

Course Objectives Specifically, the objectives of this class are to:

- (1) Establish fundamental knowledge regarding major physical and chemical processes associated with soil formation and change.
- (2) Develop the ability to interpret and communicate how Earth's terrestrial surface is affected by the "soil forming factors".
- (3) Practice describing/characterizing soil in the field, as part of larger landscapes.
- (4) Improve quantitative capabilities related to soil processes and properties.

Course Structure* Monday and Wednesday morning meetings consist primarily of lectures and in-class activities. Wednesday afternoon meetings are primarily field-based and provide hands on opportunities to re-enforce topical concepts covered in-class. The approximate ratio of field time to in-class time is 2:1. For Distance-education students, all lectures are recorded and available through Teams, and our bi-weekly meetings will include "virtual" field trips and activities that recreate hands on experiences of on-campus students.

Required Books Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Soil Science Division Staff. 2017. Soil survey manual. C. Ditzler, K. Scheffe, and H.C. Monger (eds.). USDA Handbook 18. Government Printing Office, Washington, D.C.

Both are free at <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/ref/>
 ...ORDER OR DOWNLOAD THEM NOW

Assignments	<u>SWS 4715 (Undergraduate)</u>	<u>SWS 5716 (Graduate)</u>
	Field Activities 150 (23%)	Field Activities 150 (19%)
	Finger Exercises (n=10) 250 (38%)	Finger Exercises (n=10) 250 (31%)
	Field Based Final 100 (15%)	Field Based Final 100 (13%)
	Oral Final 150 (23%)	Oral Final 150 (19%)
		Pedology Presentations 150 (19%)
	TOTAL 650	TOTAL 800

Grading Late or missing assignments will be accepted unless arrangements have been made with the instructor or medical justification has been authenticated. Final letter grades will be determined for each student by summing all points accumulated, dividing by the total number of points possible, and multiplying by 100%. Letter grades will be assigned as follows on a final percentage (%) basis:

100-94=A	93-90=A-	
89-87=B+	87-84=B	83-80=B-
79-77=C+	77-74=C	73-70=C-
69-60=D		
<59=E		

Assignment Descriptions Field Activities: Because field experience is central Pedology and approximately two-thirds of time together will be in the field, engaging in field exercises is required to accomplishing the course objectives. Attendance, participation, and completion of field activities are mandatory. Certainly absences will be accommodated following University of Florida Policies* assuming that the student communicates with me within 48 hours of a missed field activity. A respectful, curious, and positive attitude will make everyone’s time outdoors more productive and enjoyable. When we are working together in the field, no cell phones.

*<https://catalog.ufl.edu/ugrad/current/regulations/info/Attendance.aspx>

Finger Exercises: To improve quantitative capabilities related to soil processes and properties a total of 10 out of class exercises (worth 25 points each) will be assigned. These exercises will predominately be mathematical in nature, but will also include interpretation of your calculations. Finger exercises **are not designed to occupy inordinate amounts of your time**. Rather, like the pianist who develops muscle memory by playing the same song over and over, these exercises aim to develop you “muscle memory” related to basic quantification of soil properties. For each assignment, 25 points are awarded for correct calculations and interpretations, 20 points for partially correct calculations and interpretations, and 15 points for incorrect correct calculations

and interpretations. As long as finger exercise is turned in on time, right or wrong, you will never receive less than 15 points.

Field Based Final: At the end of the semester Pedology field skills will be individually assessed. On-campus sections will view three soil profiles, and will independently to describe and interpret these profiles. Distance-education sections will be provided with a virtual version of this assessment.

Oral Final: The final exam will be oral. Over the course of the semester you will be presented with ~40 questions designated for this assessment. During the oral final each student will be asked *verbatim* three of these questions. Each question is worth 50 points each, and each has a one to three sentence answer that is “correct”. Providing this “correct” answer will be worth 40 points. The additional 10 points can be earned by demonstrating a depth of knowledge beyond simply the “correct answer” (i.e. additional details and insights). Partial credit will be awarded for partially correct/complete answers. Questions will be selected randomly without replacement.

Soil Formation Presentations: Students enrolled in graduate sections will work in teams of two (sometimes three) to prepare and deliver *two*, 15 minute long, presentations. Each presentation will focus on a particular soil of your choosing and explore how processes of soil formation are related to a management issue and/or scientific question. Each team will consist of On-campus and Distance-education students who will work together to (1) Outline a management or scientific issue, (2) Comprehensively describe a soil, and (3) Discuss how *all* of the soil forming factors influence the soil and its role in the management or scientific issue.

**Other Things
You Will
Likely Need**

Unless hazardous weather is upon us, our field activities will not be interrupted by rain, heat, or wind. Accordingly, be prepared to be outdoors and consider the following to be required:

Water bottle	Close toed shoes
Rain gear	Hat
Long pants	Sunscreen

Water and Gatorade will be provided to you, but snacks are your own responsibility.

Keep in mind that you will be regularly handling and auguring soil. Do not wear clothes into the field if you don't want them soiled.

Academic Honesty

We have committed to uphold the University of Florida Honor Code. It can be found here, <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Appendix A Meeting location for on-campus fieldtrips



On campus sections of this course will meet on McCartney Drive, just west of McCarty Hall D, for Wednesday field trips.

Appendix B

SWS 4715/5716 Environmental Pedology Spring 2023 Lecture Topics and Schedule

- January 11** **No Lecture, Allan in Live Oak for extension work**
- January 18** **The conceptual model of pedology and the factors of soil formation**
“Early Concepts of Soil” in Chapter 1
“Modern Concept of Soil” in Chapter 1
- January 23** **Common processes and expressions of soil formation - Part 1**
- January 25** **Common processes and expressions of soil formation - Part 2**
- January 30** **Soil morphology and horizonation** (~30 pages of reading here)
“Soil Color” in Chapter 3 (stop after “Dominant Color” section on page 151)
“Particle-Size Distribution” in Chapter 3
“Soil Texture” in Chapter 3
“Soil Structure” in Chapter 3
“Designations for Horizons and Layers” in Chapter 3 (stop after “The Caret Symbol” section on page 109)
- February 1** **Redox processes and expressions in soil - Part 1**
“Redoximorphic Features” in Chapter 3
- February 6** **Redox processes and expressions in soil - Part 2**
“Soil Color” in Chapter 3 (start at “Other Non-Matrix Colors” section on page 151 and stop after “Color Pattern Within the Soil” section on page 154)
- February 8** **Parent material - Part 1**
“Parent Material” in Chapter 2
“Bedrock” in Chapter 2
- February 13** **Parent material - Part 2**
- February 15** **The notion of soil production**
- February 20** **USDA Soil Taxonomy/Classification - getting to the soil Order**
- February 22** **USDA Soil Taxonomy/Classification - beyond the soil Order**
- February 27** **Soil classification and soil survey** (~18 pages of reading here)
“Soil Survey - Definition and Description” in Chapter 1
“Development of Soil Survey in the U.S.” in Chapter 1
“Soil Mapping Process” in Chapter 4
“Soil Identification and Classification” in Chapter 4
“Soil Map Units” in Chapter 4
“Kinds of Map Units” in Chapter 4
“Naming Map Units” in Chapter 4

- March 1** **Anthropedology** (~17 pages of reading here)
"Introduction" in Chapter 11
"Background" in Chapter 11
"Importance" in Chapter 11
"Occurrence" in Chapter 11
"Identification" in Chapter 11
"Survey Methods and Procedures" in Chapter 11 (only the "Classification" section and Tables 11-1 and 11-2 that start on page 542)
"Pedon Descriptions" in Chapter 11
- March 6** **Other Systems of Soil Classification - Part 1**
- March 8** **Other Systems of Soil Classification - Part 2**
- March 20** **"Texture" of Organic Soil Materials**
- March 22** ***Discussion of Soil Survey "Finger Exercise"**
- March 27** **Hydric Soils - Part 1**
- March 28** **Hydric Soils - Part 2**
- April 3** **TBD: Data Analysis of Soil Profiles / Guest Speakers / Soil Survey Exercise**
- April 5** **TBD: Data Analysis of Soil Profiles / Guest Speakers / Soil Survey Exercise**
- April 10** **TBD: Data Analysis of Soil Profiles / Guest Speakers / Soil Survey Exercise**
- April 12** **Sense and Nonsense - Part 1**
- April 17** **Sense and Nonsense - Part 2**
- April 19** ***Graduate Student Pedology Presentations**
- April 24** ***Graduate Student Pedology Presentations**
- April 26** **No Lecture, Field Final in the afternoon for on campus sections**

NOTES

Reading associated with each lecture (ideally to be completed by the student prior to the lecture) is provided in italics and come from the USDA Soil survey manual which can be accessed online and/or ordered for free at <https://www.nrcs.usda.gov/resources/guides-and-instructions/soil-survey-manual>.

All lectures will be recorded and uploaded to the class Team shortly after delivery on campus such that distance education students can and are responsible for viewing.

*Identifies in class lectures/activities that distance education students need not view a recording as they will participating in these activities during distance education meetings.