

Soil properties, morphology and formation (Fall 2018)

GEOL 4335 (CRN18367)/5315 (CRN13797)

9:00-10:20 Tuesday and Thursday, Geology 320

Instructor: Dr. Lixin Jin; 221A Geology Building; 747-5559; ljin2@utep.edu

Office hours: T/Th 8-9; or by appointment

Course Objectives: This course centers on the overlap of soil science and geology. Our goal is to explain the fundamental principles in soil sciences, introduce the concept of critical zone, where water, rock, biology, and atmosphere interact as a system, understand: (1) how the interactions of landform, topography, climate, and biota result in patterns of soil development and the distribution of soils that we observe within the landscape; (2) how physical, chemical and biological properties of soils affect water and nutrient availability to plants; (3) how nutrients are cycled within terrestrial ecosystems; and (4) what are the typical types of soils in the El Paso regions and how these soils are influenced by climate and human activities. This course will also provide training on routine analyses of soil quality.

Prerequisites: Students are expected to have a background in geology, chemistry and biology. In particular, a working knowledge of chemical equilibria, ionic solution chemistry, pH, and oxidation-reduction reactions, different types of minerals and rocks and their reactivity, is highly recommended. Students without such background should consult with the instructor before enrolling.

Textbooks:

Brady, N.C., and R.R. Weil. 2002. *The Nature and Properties of Soils*, 13th Edition. Collier MacMillan Publishers, N.Y. (Fundamental levels)

Daniel Strawn, Hinrich Bohn, and George O'Connor. 2015. *Soil Chemistry*, fourth Edition, Wiley Blackwell. (Intermediate levels)

Randall Schaetzl, and Sharon Anderson. 2005. *Soils: Genesis and Geomorphology*, Cambridge. (Advanced levels)

Grades: Course grades are distributed as follows

4 exams* (15% each); Presentation (8%); homework and quiz (25%); Participation (7%)

A: >90%, B: 80-90%, C: 70-80%, D: 60-70%, F: <60%

*Exams II through IV are not cumulative. Exams cannot be made-up without prior notice to the instructor.

The College of Science aligns with UTEP's posted drop date of November 2 for the Fall 2018 semester. We will not approve any student- or faculty-initiated drop requests for a course after that date, except under circumstances of complete withdrawal of all courses due to medical or non-medical reasons.

Disability Statement: "If you have or suspect a disability and need an accommodation, contact Disabled Student Services (DSSO) at 747-5148 or at dss@utep.edu or visit us in Room 106 Union East Building."

Lecture Schedule*

Date	Subject
Aug 28: W1	Introduction to Soil Science
	I. Soil Physical Properties
Aug 30: W1	A. Soil Texture, Structure and Color
Sept 4: W2	B. Master soil Horizons, Bulk Density, and Pore Space
Sept 6: W2	C. Soil Water
Sept 11: W3	D. Soil Atmosphere and Temperature
Sept 13: W3	(EXAM I)
	II. Soil Chemical Properties
Sept 18: W4	A. Structure and Function of Clay Minerals
Sept 20: W4	B. Soil Organic Matter
Sept 25: W5	C. Cation Exchangeable Reactions, Base Saturation
Sept 27: W5	D. Soil pH, Acidify, and Buffer Capacity
Oct 2: W6	E. Soil salinity, sodicity, and alkalinity
Oct 4: W6	F. Soil Analysis (student presentation)
Oct 9: W7	(EXAM II)
	III. Soil Development
Oct 11: W7	A. Parent Material
Oct 16: W8	B. Weathering
Oct 18: W8	C. Climate and Biota
Oct 22: W9	D. Topography and Time
Oct 24: W9	E. Assessing Weathering Intensity
Oct 29: W10	F. Soil Genesis: Mass balance, strain
Nov 1: W10	(EXAM III)
	IV: Landscape Evolution
Nov 6: W11	A. Critical Zone Science
Nov 8: W11	B. Surface Morphometry
Nov 13: W12	C. Catena
Nov 15: W12	D. Soil Classification
Nov 20: W13	No Class: Thanksgiving
Nov 22: W13	No Class: Thanksgiving
Nov 27: W14	E. Soil Taxonomy
Nov 29: W14	F. Paleosol, Paleoclimate
Dec 4: W15	G. Stresses on local soil sustainability
Dec 6: W15	H. Pedogenic carbonate
Dec 11: W16	Exam IV (meet at class room at 9AM)

This schedule is subject to changes as semester moves along.