

Soil properties, morphology and formation (Spring 2015)

GEOL 4315 (CRN27330)/5315 (CRN27331)

12:00-13:20 Tuesday and Thursday

Instructor: Dr. Lixin Jin

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Office hours: T and Th 13:30-14:20; 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.

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)

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

Grades: Course grades are distributed as follows

3 exams (25% each); homework and quiz (20%); Participation: 5%

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

Exams II and III are not cumulative. Exams cannot be made-up without prior notice to the instructor.

The UTEP drop deadline is April 6, 2015.

"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
Jan 20: W1	Introduction to Soil Science I. Soil Physical Properties (BW chapter 4, 5,6,7; Part1 SA 2, 3, 4, 5)
Jan 22: W1	A. Soil Texture, Structure and Color
Jan 27: W2	B. Master soil Horizons, Bulk Density, and Pore Space
Jan 29: W2	C. Soil Water
Feb 3: W3	D. Soil Atmosphere and Temperature
	II. Soil Chemical Properties
Feb 5: W3	A. Structure and Function of Clay Minerals
Feb 10: W4	B. Soil Organic Matter
Feb 12: W4	C. Cation Exchangeable Reactions, Base Saturation
Feb 17: W5	D. Soil pH, Acidify, and Buffer Capacity
Feb 19: W5	E. Soil Redox and Fe
Feb 24: W6	EXAM I
	III. Soil Development
Feb 26: W6	A. Parent Material
Mar 3: W7	B. Weathering
Mar 5: W7	C. Climate and Biota
Mar 10: W8	No Class (Spring break)
Mar 12: W8	No Class (spring break)
Mar 17: W9	D. Topography and Time
Mar 19: W9	E. Assessing Weathering Intensity
Mar 24: W10	F. Soil Genesis: Mass balance, strain
Mar 26: W10	EXAM II
	IV: Landscape Evolution
Mar 31: W11	No Class (Cesar Chavez Birthday)
Apr 2: W11	A. Critical Zone Science
Apr 7: W12	B. Surface Morphometry
Apr 9: W12	C. Catena
Apr 14: W13	D. Soil Classification
Apr 16: W13	E. Soil mapping
Apr 21: W14	F. Soil Taxonomy
	V: Local Soils
Apr 23: W14	Paleosol, Paleoclimate
Apr 28: W15	Stresses on Soil Sustainability
Apr 30: W15	Pedogenic carbonate
May 5: W15	Soil analysis, Exam Review, Evaluation
May 7: W16	Exam III

This schedule is subject to changes as semester moves along.