Soil properties, morphology and formation (Spring 2013**)**

GEOL 4315 (CRN28438)/5315 (CRN28439)

ESCI 4315 (CRN27313)/ESCI 5315 (CRN26343)

9:00-10:20 Tuesday and Thursday

Instructor: Dr. Lixin Jin

221A Geology Building; Phone: 747-5559; Email: ljin2@utep.edu

Office hours: T and Th 10:30-11:30; 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.

Required and recommended texts: Brady, N.C., and R.R. Weil. 2002. The Nature and Properties of Soils, 13th Edition. Collier MacMillan Publishers, N.Y. (required). Randall Schaetzl, and Sharon Anderson. 2005. Soils: Genesis and Geomorphology, Cambridge (recommended reading).

Grades: Course grades are distributed as follows

Exam 1: 30%; Exam 2: 30%; Exam 3: 30%; Participation: 10%

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. Final letter grades will be assigned based upon the point distribution with consideration of other aspects of performance, such as effort, participation, and improvement.

"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 22: W1	Introduction to Soil Science
	I. Soil Physical Properties
Jan 24: W1	A. Soil Texture, Structure and Color
Jan 29: W2	B. Master soil Horizons, Bulk Density, and Pore Space
Jan 31: W2	C. Soil Water
Feb 5: W3	D. Soil Atmosphere and Temperature
	II. Soil Chemical Properties
Feb 7: W3	A. Structure and Function of Clay Minerals
Feb 12: W4	B. Soil Organic Matter
Feb 14: W4	C. Cation Exchangeable Reactions, Base Saturation
Feb 19: W5	D. Soil pH, Acidify, and Buffer Capacity
Feb 21: W5	E. Soil Redox and Fe
Feb 26: W6	**EXAM I**
	III. Soil Development
Feb 28: W6	A. Parent Material
Mar 5: W7	B. Weathering
Mar 7: W7	**No Class**
Mar 12: W8	C. Climate and Biota
Mar 14: W8	D. Topography and Time
Mar 19, 21: W9	Spring break, no class
Mar 26: W10	E. Assessing Weathering Intensity
Mar 28: W10	F. Soil Genesis: Mass balance, strain
Apr 2: W11	**EXAM II**
	IV: Landscape Evolution
Apr 4: W11	A. Critical Zone Science
Apr 9: W12	B. Surface Morphometry
Apr 11: W12	C. Catena
Apr 16: W13	D. Soil Classification
Apr 18: W13	E. Soil mapping
Apr 23: W14	F. Soil Taxonomy
	V: Local Soils
Apr 25: W14	Paleosol, Paleoclimate
Apr 30: W15	Stresses on Soil Sustainability
May 2: W15	Pedogenic carbonate
May 7: W16	Exam Review, Evaluation
May 9: W16	**Exam III**

* This schedule is subject to changes as semester moves along.