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

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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.


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**

<table>
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<tr>
<th>Date</th>
<th>Subject</th>
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| Jan 22: W1 | Introduction to Soil Science  
I. Soil Physical Properties |
| Jan 24: W1 | A. Soil Texture, Structure and Color  
II. Soil Chemical Properties |
| 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  
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  
**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  
**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.*