

# COURSE SYLLABUS

GEOG 335/535: Introduction to Soil Geography  
Fall 2011

## Instruction

**Professor:** Dr. Daniel R. Hirmas

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**Office Hours:** M 1 – 2pm, W 2 – 4pm; or by appointment

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**Teaching Assistant:** Dennis Eck

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**Office Hours:** T 9:30-10:30am, W 2:30-3:30pm; or by appointment

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**Textbook:** Elements of the Nature and Properties of Soils (3rd Edition)

**Authors:** N.C. Brady and R.R. Weil

**Price:** \$103.00 (KU Bookstore); \$83.64 (Amazon.com)

**Additional Course Materials:** Laboratory Manual (sold only at the KU Bookstore in the Union); Blackboard (courseware.ku.edu)

**Lecture:** TR 8:00 – 9:15am in 228 Lindley Hall

**Lab:** M or T 2 – 3:50pm in 421 Lindley Hall

## Objectives

This class is an introduction to the properties and processes of soils as they occur in their environment. We will discuss the nature of soil as it functions as a body (*soil morphology*), formation and genesis of soils (*pedology*), nature and properties of soil solids especially clays and colloids (*soil mineralogy*), chemical composition, properties, and reactions of soils (*soil chemistry*), interaction between solid, liquid, and gaseous components of soils (*soil physics*), plant, soil, and water relationships (*soil fertility*), biological interactions with soil (*soil biology*), classification of soils (*soil taxonomy*), and the distribution of soils on the landscape (*soil geomorphology*).

## Grading

**Homework Assignments:** There will be four homework assignments passed out in lecture during the semester each worth 5% of your final grade.

**Lab Assignments:** There will be 15 assignments to be completed in conjunction with the lab worth a total of 25% (335) or 20% (535) of your final grade. These are due at the beginning of lab the following week.

**Exams:** Three midterms, each worth 10% (335) or 7% (535), and a final exam worth 20% (335) or 14% (535) will be given during the semester. The exams will be true/false, multiple choice, short answer essay, and problem solving.

**Final Project:** For those taking GEOG 535, you will be required to complete a final lab project (worth 20% of your final grade) using techniques learned throughout the semester. A series of assignments due throughout the semester will help you design and implement your project. All projects will be independently run by each student.

**Participation:** You will be required to answer a multiple choice question or write out a 25-word précis via Blackboard 24 hours before lecture. Your participation in these exercises is worth 5% of your final grade.

**Field Trips:** There will be one Saturday field trip: September 10 (8am – 1pm). Your attendance in this field trip will be assessed as part of your laboratory grade.

**Late Assignments:** Assignments submitted within 48 hours of the due date and time will be assessed a 50% penalty and assignments submitted after 48 hours of the due date and time will not be accepted.

**Cheating:** Any student caught cheating (on any assignment!) will receive a final grade of F and be brought up on charges with the University Senate. (See University Senate Rules and Regulations for questions about what constitutes ‘cheating.’)

## Lecture Schedule

### Part 1. Soil Morphology, Pedology, and Clay Mineralogy

- Week 1 **Aug 23** Course outline; Introduction; Major components of soil; Pedon  
**Aug 25** Soil morphology
- Week 2 **Aug 30** Soil morphology (cont.)  
**Sep 1** Soil morphology (cont.); Factors of soil formation
- Week 3 **Sep 6** Factors of soil formation (cont.)  
**Sep 8** Factors of soil formation (cont.); Process models  
**Sep 10** **Saturday Field Trip** (8am – 1pm)  
Sep 11 Field Trip backup date (8am – 1pm)
- Week 4 **Sep 13** Clays; Clay mineralogy  
**Sep 15** Clay mineralogy (cont.); Particle charge origin
- Week 5 **Sep 20** Cation exchange capacity; **Final Project Title/Abstract Draft 1** (535 only)

### Part 2. Soil Physics

- Sep 22** Soil physical properties
- Week 6 **Sep 27** **Homework 1**; Soil physical properties (cont.); Optional review for Exam 1 (7 – 9pm)  
**Sep 29** **Exam 1**
- Week 7 **Oct 4** Soil physical properties (cont.) Energy-states of soil water; **Final Project Title/Abstract Draft 2** (535 only)  
**Oct 6** Energy-states of soil water; SMC curve
- Week 8 **Oct 11** **Fall Break – No class**  
**Oct 13** Water flow in soil; Solute transport
- Week 9 **Oct 18** **SSSA – No class**  
**Oct 20** **Homework 2**; Infiltration; Energy balance; Heat flux
- Week 10 **Oct 24** Optional review for Exam 2 (7 – 9pm)  
**Oct 25** **Exam 2**

### Part 3. Soil Chemistry and Soil Fertility

- Oct 27** Heat flux (cont.); Evapotranspiration; Salinity; **Final Project Paragraph/References Draft 1** (535 only)

- Week 11 **Nov 1** Acid soils; Base saturation  
**Nov 3** Redox reactions; EPA Wetlands Project (Aaron Koop)
- Week 12 **Nov 8** Flooded soils; Organic matter; **Final Project Paragraph/References Draft 2**  
(535 only)  
**Nov 10 Homework 3**; Carbon cycle - Organic and inorganic carbon; Nitrogen cycle
- Week 13 **Nov 15** Soil fertility; Liebig's Law of the Minimum; Nitrogen  
**Nov 17** Phosphorous; Potassium; Micronutrients
- Week 14 **Nov 21** Optional review for Exam 3 (7 – 9pm)  
**Nov 22 Exam 3**

#### **Part 4. Soil Biology, Erosion, Soil Taxonomy, and Soil Information**

- Nov 24 Thanksgiving Break – No class**
- Week 15 **Nov 29** Soil organisms as factors of soil formation; Soil erosion  
**Final Project Figure/Table Check** (535 only)  
**Dec 1** Soil erosion (cont.); Soil taxonomy
- Week 16 **Dec 6** Soil taxonomy (cont.)  
**Dec 8 Homework 4**; Soil information; Mapping; Soil surveys; Optional review for the  
Final Exam (7 – 9pm); **Final Project Draft 1** (535 only)
- Finals **Dec 12 Comprehensive Final Exam 10:30am – 1pm**  
**Dec 16 Final Project** (535 only)

## **Reading Schedule**

### **Part 1. Soil Morphology, Pedology, and Clay Mineralogy**

- Week 1 **Aug 23** Sections 1.1-1.8, 1.10-1.14, 1.18, 3.1  
**Aug 25** Sections 1.9, 2.9
- Week 2 **Aug 30** Sections 4.1-4.4  
**Sep 1** Sections 2.1-2.5
- Week 3 **Sep 6** Sections 2.6-2.7  
**Sep 8** Sections 2.8
- Week 4 **Sep 13** Sections 8.1-8.2  
**Sep 15** Sections 8.3-8.5, 8.6
- Week 5 **Sep 20** Sections 8.7-8.9, 8.10 (only 'Influence of Complementary Cations')

### **Part 2. Soil Physics**

- Sep 22** Section 4.7
- Week 6 **Sep 27** Section 4.8  
**Sep 29 Exam 1 – No reading**
- Week 7 **Oct 4** Sections 5.1-5.3  
**Oct 6** Section 5.4
- Week 8 **Oct 11 Fall Break – No class**  
**Oct 13** Sections 5.5, 5.7, 5.8-5.10
- Week 9 **Oct 18 SSSA – No class**  
**Oct 20** Sections 5.6, 6.3-6.5, 7.1-7.2, 7.9-7.10
- Week 10 **Oct 25 Exam 2 – No reading**

### **Part 3. Soil Chemistry and Soil Fertility**

- Oct 27** Sections 7.11-7.12, 9.10-9.16, 9.18-9.19
- Week 11 **Nov 1** Sections 9.1-9.6, 9.8, 8.10  
**Nov 3** Sections 7.3
- Week 12 **Nov 8** Sections 7.7, 11.1-11.4, 11.6  
**Nov 10** Sections 11.7, 11.10, 12.1

Week 13 **Nov 15** Section 13.1  
**Nov 17** Sections 12.3-12.4, 12.7-12.8  
Week 14 **Nov 22** **Exam 3 – No reading**

**Part 4. Soil Biology, Erosion, Soil Taxonomy, and Soil Information**

**Nov 24** **Thanksgiving Break – No reading**  
Week 15 **Nov 29** Sections 10.1-10.9, 10.11-10.14, 14.1-14.4  
**Dec 1** Sections 14.5-14.8, 14.10-14.11, 3.2-3.12  
Week 16 **Dec 6** Sections 3.13-3.17 (cont.)  
**Dec 8** Sections 3.18-3.20