

INTRODUCTION TO SOILS

PSSC 250, Spring 2012

Lecture: MW 10-10:50 AM in Plumas 205.

Laboratory: Section 02 - Monday 2-4:50 PM Plumas 333

Section 03 – Wednesday 2-4:50 PM Plumas 333

Instructor

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Plumas 219

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Office hours: MW 11-1 PM, TR 11-12 PM or by appointment (if my door is open please inquire)

Course Prerequisites

CHEM 107 (or permission of instructor)

Course Objectives

To provide you with:

1. Knowledge of soil science that can be applied to your personal and professional activities.
2. An understanding of soil's role in crop production and our environment.
3. An understanding of the soil's physical, chemical, and biological properties.
4. Knowledge about how soils are formed, classified, and interpreted for land use management.
5. Knowledge about the soil's relevance to plant nutrient cycling and sustainable agriculture.

Student Professional Outcomes from This Course

Some major outcomes for students include:

1. Recognize and measure the fundamental physical and chemical properties of soil.
2. Use a soil survey manual to agricultural and environmental tasks.
3. Describe the major differences between soils and how they were formed.
4. Identify, analyze, and interpret the influencing soil properties for crop production.
5. Understand the environmental implications of specific agricultural and other land use practices.
6. Identify the primary and secondary macronutrients, and how they are retained in the soil.

Required textbook:

Brady, N.C. and R.R. Weil. 2008. The Nature and Properties of Soils (14th ed.) Prentice-Hall, Inc.

- **2008 14th edition or 2002 13th edition (or 1999 12th edition).** *Page numbers for 13th and 12th editions will be different than those of the 14th edition that I refer to.*

Laboratory manual and lecture outline:

- ❖ The syllabus, lecture outlines, homework questions, laboratory exercises, and PowerPoint lectures are on Web CT.

General course requirements:

- Participation and discussion in lecture and lab are part of your grade. I would appreciate questions on the subject matter from you.
- **Respect your fellow students and instructor, anything less will be unacceptable!** I will dismiss any individual disrupting the lecture or lab.
- Attendance in lecture and labs is mandatory. More than 50% absence will result in a failing grade. In lecture, I will take attendance at least 75% of the time. Leaving during laboratory exercises without prior instructor approval will count as an absence.
- Be consistent in readings, homework, and review of lecture notes. We cover a lot of material, and you will be at a great disadvantage if you get behind.
- Read the assigned textbook pages but if you cannot comprehend certain statements, move on and ask the instructor for clarification. The textbook is an excellent reference.
- **Students may not read other materials (newspapers, magazines) during class.**
- **Please turn off your cell phones and remove your computers.**
- **Using computers in class (without special permission) will result in being marked absent for that lecture.**
- Students are to remain in class during the entire session with the exception of necessary breaks.
- **The class follows the standards set in the California State University Code of Students Rights and Responsibilities (EM 08-40) and students are subject to disciplinary action for violation of that code.**
Please refer to: <http://www.csuchico.edu/prs/EMs/2008/08-040.shtml>
Students will follow CSU standards of academic integrity. There will be no tolerance of plagiarism, unauthorized collaboration of assignments, and any forms of cheating in tests.

Written lab assignments, homework questions, presentation, textbook readings, and exams:

- **You are required to read the laboratory exercises before coming to lab. Hand-in the last page questionnaire (in-lab Exercises 1-9) at the beginning of each weekly laboratory period.**
- **Absence from laboratory periods or field trips will result in loss of grade points (30 or 25 points).**
- **Any approved laboratory make-up will be for a maximum of 20 points.**

- **My lectures generally follow the chapters in our textbook. Take careful notes and read assigned chapters in textbook.**
- **You will be required to answer the Homework questions provided at the end of each section of the lecture outline (see reader) on the specified date indicated. Additional information on homework submission on page 4.**
- **You are required to do a class presentation on a current event relating to soil. Additional information provided on page 4.**
- **All subjects presented in lectures and laboratory exercises can be in the exams.**
- **Handing in late homework or lab. exercises will be penalized by deducting 20% off the grade points for each day late.**
- **You may bring to the laboratory any soil of interest to you to perform many of the experiments.**

Why Participate?

- Homework questions can be asked in lecture prior to the deadline for submission.
- In pursuing a career, employers look for hiring individuals who can communicate. This includes asking questions and taking part in discussions.
- **The more you participate, the more I will know you as an individual with a name!**

Any problems, questions, or other concerns during the semester?

I am flexible and fair regarding your ability to perform the requirements for the course, but I will not be aware of any problems, etc. you may have. Please inform me of any problems in advance (if possible) that may arise that will affect your ability to attend or perform in the course.

You may visit me at my office hours that are listed at the top of the first page.

You can e-mail me for any issues that may arise or questions you may have.

If you have a disability that requires special accommodations, you must contact a counselor at Disability Support Services, Building E, Room 107 (530) 898-5959. In addition, please let me know as soon as possible and I will provide you with the information you will need to receive services.

Grading of PSSC 250

- 220 points in class exams; 2 Mid-term exams (120pts) and 100 pts Final (comprehensive).
150 points for homework questions.
350 points laboratory (grade includes written lab exercises & and attendance); laboratory exercises 30 points each, field trips 25 points each.
70 points for lecture attendance
You can earn 70 points for 100% attendance. Less than 100% will result in a proportionate deduction of points.
70 points current event presentation in class.
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860 total points in calculating final grade.

**Extra credit --- +15 points for each additional current event presentation and +40 points for active participation in class.*

Grading:	100-95%	A	94-90%	A-
	89-85%	B+	84-80%	B
	79-75%	B-	74-70%	C+
	69-65%	C	64-60%	C-
	59-55%	D+	54-50%	D
	< 50%	F		

(Percentage rounded to closest whole number)

If there is evidence that you have been involved in any form of academic dishonesty, you will receive an "F" grade for the course and a report will be provided to Student Judicial Affairs for further action.

Homework Questions Format

1. Homework questions must be submitted on date due indicated in *homework assignments* section above.
2. Homework answers must be typed, 12-point font, and double-spaced.
3. Homework due at the beginning of lecture.

Current Event Presentation

1. Every student **must do** a current event presentation of which you can either receive up to 70 points for a high quality presentation. Points will be deducted for lack of preparation or poorer quality presentations.
2. **You must submit a typed paragraph narrative** to me when you give your presentation that includes the source (journal, website, newspaper, etc.). **The narrative should include why the topic is relative to soil.** Twenty points of the 70.
3. The topic of the current event must include a soil's component. As long as you point out the topic's relationship to soil, the current event subject can include plants, water, public health, chemicals, farm equipment, management, air quality, construction, etc.

4. The topic can be obtained from newspaper, magazine, or Internet web-based. Some suggestions for web-based sites include,

<http://www.enn.com/>

<http://www.sciencedaily.com/>

other newspapers or magazines

Use the web site's search option if you cannot find a current article.

5. **Give the source of your topic at the start of your presentation.**
6. Consider giving a three to five minute presentation.
7. The current event will be graded for 70 points for a high quality presentation where you point out the current event's relationship to soil and give a good overview of the subject. Points will be deducted for lower quality presentations.
8. At the start of the semester I will seek volunteers who would like to give a presentation the following week. When there are no more volunteers, I will start assigning a presentation time to those who haven't given one. Once we have all given one presentation, I will allow you to give a second one as extra credit for an additional 15 points.

Collect Your Own Lab Soil Samples

For laboratory exercises 2-3, 5-9

- To keep these labs relevant and of special interest to you, consider using the same soil sample throughout the laboratory exercises.
- Consider taking your own samples from an area of interest to you such as your home site or farm/ranch.
- You will need about 1 lb. of loose soil sample from the 0-8 inches depth. Make this sample a composite of several holes. For example, use a shovel and dig a hole to 8 inches. Collect sample and put in bucket. Do this at least two more times digging two more holes at least. Mix the soil in the bucket and then collect 1 lb. soil sample in a plastic bag. Keep the bag open to dry in your car or in a sunny spot.
- From the same area of interest collect about 5 clods or aggregates for use in determining bulk density.
- You will also take soil samples and clods from the University Farm.

Lecture Subjects, Textbook Readings, & Homework Assignments
 (The schedule may change somewhat to accommodate flexibility and class needs.)

Chapter	Topic	Required Textbook Readings 14th edition	Homework due - see homework questions
	Introduction – first day of class	---	---
1	What is Soil Science? – Chapter 1 (and plant nutrients)	pages 2-30	Wed 2-1-12 (15 pts)
2	Chpt 2 - Formation of Soils from Parent Materials (and sources of plant nutrients)	33-73	Wed 2-8 (15 pts)
3	Chpt 3 - Soil Classification	77-117	Wed 2-15 (15 pts)
	Exam I on Wednesday February 22, 2012 (Chpts 1-3)		
4	Chpt 4 - Soil Architecture and Physical Properties	122-162	Wed 2-29 (15 pts)
5	Chpt 5 - Soil Water: Characteristics and Behavior (and mobility of plant nutrients)	174-214	Wed 3-7 (15 pts)
6	Chpt 6 -Soil and the Hydrological Cycle	219-263	Wed 3-14 (15 pts)
7	Chpt 7 - Soil Aeration and Temperature	267-306	Wed 3-28 (15 pts)
8	Chpt 8 - Soil Colloids: Their Nature and Practical Significance	311-354	Wed 4-4 (15 pts)
9	Chpt 9 - Soil Acidity & Alkalinity	359-396	Wed 4-11 (15 pts)
	Exam II on Wednesday April 18, 2012 (*just Chpts 4-8)		
10	Chpt 10 -Alkaline and Salt-affected Soils and Their Management	402-440	Wed 4-25 (15 pts)
11	Chpt 11 - Organisms and Ecology of Soil	444-491	Wed 5-2 (15 pts)
12	Chpt 12 - Soil Organic Matter	496-538	Extra (15 pts)
13	Chpt 13- Nitrogen and Sulfur Economy of Soils	543-589	Extra (15 pts)
14	Chpt 14 - Soil Phosphorus and Potassium	595-635	Extra (15 pts)
15	Micronutrient Elements		Extra (15 pts)
	Final Exam on Wed. May 16, 2012 @ 10-11:50 AM		

Laboratory Schedule Spring 2011; Monday or Thursday 2-5 PM

<u>When</u>	<u>Topic</u>	<u>Where</u>
January 23 or 25	Meet to assign lab drawers	Plumas 333
Jan 30 or Feb 1	Soil Parent Materials - Exercise 1	Plumas 333
Feb 6 or 8	Soil Texture and Color – Exercise 2	Plumas 333
Feb 13 or 15	University Farm @ 2:25 PM – overview soils, characterization, collecting peds (drive yourself to the farm)	University Farm
Feb 20 or 22	Soil Density, Porosity, and Structural Stability – Exercise 3.	Plumas 333
Feb 27 or 29	Use of Soil Survey: Land and Soil Descriptions, and Land Planning. – Exercise 4.	Plumas 333
March 5 or 7	Field Trip to CSU Rangeland Property	1st and Ivy Bus stop @2 PM
March 12 or 14	Current Event Presentations	Room TBA
March 26 or 28	Soil Colloids, Cation Exchange Capacity, and Soil pH – Exercise 5.	Plumas 333
April 2 or 4	Soil Organic Matter – Exercise 6.	Plumas 333
April 9 or 11	Saline and Alkali Soils, and Observations of Affected Plants – Exercise 7.	Plumas 333
April 16 or 18	Nitrogen Dynamics in Soils – Exercise 8.	Plumas 333
April 23 or 25	Soil Phosphorous, Calcium, and Fertilizers - Exercise 9.	Plumas 333
April 30 or May 2	Lecture on Soil Conservation - Capability Classes, Ecological Units, and USLE – Exercise 10 & Lab Check Out.	Plumas 333