

SOIL QUALITY AND HEALTH

PSSC 356 – Spring 2012

Lecture: *Tuesday and Thursday 10-10:50 AM – Plumas 329*

Activity: *Tuesday 2-3:50 PM – Plumas 329*

Instructor

Dr. Mitchell M. Johns

College of Agriculture

Office - Plumas 219

California State University – Chico

Telephone: (530) 898-6159

E-Mail: mjohns@csuchico.edu

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

Course Description

The course examines soil quality and health as the capacity of the soil to function within natural and managed ecosystems to sustain plant and animal productivity, maintain environmental quality, and support human health and habitation. Soil quality factors or indicators are evaluated. The impact of pesticides and other introduced soil chemicals on soil health are discussed.

Course Prerequisites

PSSC 250 or instructor permission.

Course Objectives

To provide you with:

1. The concepts and methodologies of soil quality and health necessary for applying it to agriculture, rangeland, and other ecosystems.
2. Greater understanding of the relationship between soil properties, soil function, and management choices for productivity, sustainability, and environmental quality.
3. The knowledge of soil function, capacity, use, or management for (1) plant and animal productivity, (2) water and air quality, and (3) human health and habitation.
4. An understanding of the residence time and fate of organic chemicals in soil.
5. Skills in preparing and writing technical reports.

Important Student Professional Outcomes from This Course

The student should be able to:

1. Apply soil quality methodologies for interpreting land-use management of the numerous ecosystems of western US.
2. Identify, measure, and characterize specific biological, chemical, and physical properties that are soil quality indicators for specific production and conservation uses.
3. Make an assessment, and an appropriate level of interpretation of soil quality measurements and observations.
4. Predict the fate of organic chemicals in the environment using technical references/manuals of pesticides and other organic chemicals.

Required textbook, electronic references, and assigned readings:

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

- The 1999 12th edition or 2002 13th edition can be used as well.
- **Several copies are available at Limited Loan at Library.**
- **Numerous electronic files on different subjects are required from Portal Vista.**

General course requirements:

- **Participation and discussion in lecture and activities are highly recommended, encouraged, and can have a major effect on your final 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 activities is mandatory. More than 50% absence will result in a failing grade. In lecture, I will take attendance at least 80% of the time. Leaving during activity exercises without prior instructor approval will count as an absence.**
- **Be consistent in readings, homework, and review of lecture notes. We will cover all of material, and you will be at a great disadvantage if you get behind.**
- **Read the assigned readings but if you cannot comprehend certain statements move on and ask the instructor for clarification.**
- **Students may not read other materials (newspapers, magazines) during class.**
- **Please turn off your cell phones.**
- **Using computers in class will result in being marked absent for that lecture.**
- **Students are to remain in class during the entire session with the exception of breaks. Students are not allowed to come and go during the class session.**
- **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.

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 356

240 points in class exams; 2 Mid-term exams (70 pts each) and 100 pts Final (comprehensive).

300 estimated points for homework questions and activity assignments.

70 points for lecture attendance

610 approximate total points in calculating final grade.

**Bonus credit --- participation*

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.

LECTURE TOPICS AND SCHEDULE (readings required)

Week	Topics	Textbook Pages	Portal Readings
Jan 24 & 26	Background on soil properties (and importance). Biomes and ecosystems.	none	yes
Jan 31 & Feb 2	Introduction and background on soil quality. What is soil health? Perspectives and applications of soil quality.	874 – 884 (14 th ed) 871 – 877 (13 th ed)	yes
Feb 7	Parent materials and soil quality	none	yes
Feb 9	Overview of soil quality indicators. Applications to ecosystems.	496 – 539 498 - 539	yes
Feb 14 & 16	Soil organic matter dynamics as a major soil indicator. Fate and transport of organic chemicals.	795 - 837 797 - 837	yes
Feb 21 & 23	Soil nitrogen dynamics.	543 – 577 544 - 575	yes
Feb 28 and Mar 1	First Exam – March 1 Soil biology components and soil health	444 - 492 450 - 495	yes
Mar 6 & 8	Soil biology components and soil health (cont)	444 - 492 450 - 495	yes
Mar 13-15	Aerobic and anaerobic Soil Effects		yes
Mar 19-23	<i>Spring Break</i>		

<i>Week</i>	<i>Topics</i>	<i>Textbook Pages</i>	<i>Portal Readings</i>
Mar 22 & 24	Erosion processes.	740 – 791 741 - 793	yes
Mar 27 & 29	Quantitative determinations for soil and plant Salinization		yes
April 3 & 5	Soil chemical & physical indicators; and applications Second Exam – April 5		yes
April 10 & 12	Soil quality for rice production Soil quality for wheat production		
Apr 17 & 19	Land application of wastes. More on nutrient cycling and soil fertility.		yes
Apr 24 & 26	Dairy (manure) nutrient management planning Compost quality and applications.	535 – 538 515 – 518	yes
May 1-10	Soil quality and plant production (cont). Soil quality for pasture and rangeland improvement. Soil quality and forest improvement. Groundwater and surface water quality. Other topics.		yes
<i>Final Exam</i>	May 18, 2012 Friday 10-11:50 AM.		

PRELIMINARY ACTIVITY TOPICS AND SCHEDULE

<i>Date</i>	<i>Activity Topic</i>	<i>Where</i>
Jan 24	No meeting this Thursday	
Jan 31	Soil properties review - films	Plumas 329
Feb 7	Soil organic matter and pH	
Feb 14	Function assessment using soil quality/health cards	
Feb 21	Nitrogen budgeting	
Feb 28	Phosphorus budgeting	
Mar 6	Topic to be determined	
Mar 13	Water erosion quantification	
Mar 20	Spring Break	
Mar 27	Topic to be determined	
Apr 3	Wind erosion quantification	
Apr 10	Salinity assessment	
Apr 17	Water quality assessment	
Apr 24	Dairy (Manure) Nutrient Management Planning	
May 1	Environmental assessment and land-use planning	
May 8	No meeting	