

Soil Ecology and Sustainable Use

T R 9:30-10:45am, 153 Garland Hall

Instructor: Dr. Melany Fisk

Spring 2013

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In this course we will learn how soils form and function, and explore questions related to agricultural sustainability, soil biodiversity, water quality, and environmental change. Students in this course will:

- analyze interactions among key state factors that determine patterns of soil development and properties across the landscape.
- interpret the influence of physical, chemical, and biological properties on soil functions that mediate water and nutrient supply to plants, carbon sequestration, habitat for soil biota, processing of pollutants, and quality of water supply.
- evaluate sustainable use of soils in the context of environmental change and ecosystem management.

Reading Material. *Elements of the Nature and Properties of Soils*, by N.C. Brady and R.R. Weil, 3rd edition, is the textbook for this course. Textbook readings are supplemental to class materials. They are intended to provide review and clarification for topics we cover in class. The textbook will also be an important reference for some assignments. In addition, we will read articles from scientific journals; these will be provided on the Niikha site.

Niikha. We will use the course Niikha site to post relevant material, such as the course schedule, class notes, readings, and assignments. I will communicate using the email list from the Niikha site. If for some reason this form of communication is not reliable for you, it is your responsibility to stay up to date by some other means. Powerpoint files will be posted the night before class. You may wish to print out the figures to draw on during class. These files are intended to provide a general outline of material that we cover and to provide pictures and figures that we will discuss. The powerpoint files will not include all of the course content – many of the key concepts that we will cover will be discussed in class and developed using notes and diagrams on the chalkboard.

Assignments. Written assignments and group presentations will be required throughout the semester. These will relate to class material, internet resources, and the primary literature.

Graduate students in this course will extend their understanding of soils by examining in depth some question of current interest in environmental change or resource management. They will explore the question through extensive literature research, write a critical analysis of the question in standard journal article format, select appropriate readings for class, and lead one class lecture/discussion on the question.

Exams. There will be 3 exams consisting of short answer and essay questions.

Grading (numbers are approximate).

Undergraduate students		Graduate students	
Exams (3 x 100 pts each)	300	Exams (3 x 100 pts each)	300
Written assignments (4 x 25 pts)	100	Written assignments (4 x 25 pts)	100
Literature summaries (10 x 10 pts)	<u>100</u>	Soils topic assignment	20
total	500	Paper	50
		Presentation/class discussion	<u>80</u>
		total	550

Schedule (subject to change)**Spring 2013**

Date	Subject	Reading
Jan 15	Intro to state factors and soil development	Ch 1 & 2
Jan 17	Geology, weathering	Ch 2
Jan 22	Soil texture and structure	Ch 4
Jan 24	Water movement	Ch 5 and pp 172-176; 182-184
Jan 29	Clay minerals	Ch 8
Jan 31	Cation exchange	Ch 8 and pp 269-292
Feb 5	Profile development and classification	Ch 3
Feb 7	Presentations: water or structure	
Feb 12	Exam 1	
Feb 14	Presentations: soil acidification	
Feb 19	Soil biota	Ch 10
Feb 21	Organic matter decomposition	Ch 11
Feb 26	Presentations: soil organisms	
Feb 28	Soil organic matter	Ch 11
Mar 5	Soil organic matter	Ch 11 and supplementary material
Mar 7	Presentations: soil organisms	
Mar 12,14	Spring Break	
Mar 19	Nutrient cycles	Ch 12
Mar 21	Mycorrhizae	Supplementary material
Mar 26	Presentations: Nitrogen deposition	
Mar 28	Exam 2	
Apr 2	Climate change	Supplementary material
Apr 4	Presentations: climate change	
Apr 9	Soil water status, redox reactions	Ch 7
Apr 11	Wetland soils	Supplementary material
Apr 16	Presentations: wetlands	
Apr 18	Agricultural practices and land-use change	Supplementary material
Apr 23	Watershed management	Supplementary material
Apr 25	Presentations: management and C storage	
Apr 30	Presentations: water quality	
Apr 2	Final exam 10:15-12:15	