

NR 251 - Introduction to Soil and Water Resources

Tuesday, Wednesday and Thursday at Noon
Spring 2008; TNR 352

INSTRUCTORS:

George J. Kraft, gkraft@uwsp.edu
Professor of Water Resources
Office: Room 224 C (*inside Groundwater Center*) / 346-2984

Eugene P. Tubbs
Lecturer
Classrooms: TNR 352 (Lecture), TNR 262 (Laboratory)

G. Kraft's office hours T & R, 13:00-14:00. Also by appointment. Please note that because teaching is only 10% of my job, I have to travel frequently for other commitments. As a result, I sometimes will not be available for scheduled office hours. It's a good idea to call or email ahead, even for scheduled hours. Feel free to leave messages on my voice mail along with a number where you can be reached. I am usually very good about call backs and emailing responses.

COURSE DESCRIPTION

This course integrates concepts of soil and water resources at the landscape level. We will investigate physical, chemical and biological interactions in watersheds and how they are influenced by land use and management.

COURSE OBJECTIVES

1. Understand the important roles that soil and water play as components of natural ecosystems
2. Understand how soil and water interact in a watershed framework or landscape unit
3. Understand the important physical and chemical properties of soil and water
4. Understand how the management of soil and water resources affects land use planning, erosion and nutrient cycling and nutrient management
5. Learn some basic field techniques to measure physical/chemical properties of soil and water
6. Applications of EXCEL and GIS in the management of soil and water information

READING MATERIALS

Text Rental:

Brady, Nyle C., and Ray R. Weil. 2002. *The Nature and Properties of Soils – Thirteenth Edition*

Leopold, Luna B., 1997. *Water, Rivers and Creeks*. University Science Books. Sausalito, CA.

On-Line:

Winter, T.C., Harvey, J.W., Franke, O.L., and Alley, W.M. 1998. *Ground water and surface water; a single resource*. [US Geological Survey Circular 1139](http://pubs.usgs.gov/circ/circ1139/). US Govt. Printing Office. Denver, CO.

(available online at <http://pubs.usgs.gov/circ/circ1139/> or can be purchased from AWRA/SWSC student organizations)

Laboratory Manual (\$10 purchase): NR 251 lab exercises are found in the lab manual.

COURSE REQUIREMENTS

Exams: Five 75 point exams (first four in class, the fifth is the final exam). All exams will include lecture and laboratory material. *The final exam is Tuesday May 13th 8:00-10:00.*

Lab assignments: 125 points. Written assignments will be due the following lab period or a specified date.

No late assignments policy for lab: No credit will be given after the due date of the lab assignment.

Policy on lab attendance: Attendance is mandatory. If you cannot attend your lab session, you must arrange in advance to attend another lab session that week. To do so, you will need prior approval. There are no makeup labs.

HELP

(1) Meet with me during office hours or by appointment, (2) ask questions prior to, during or right after class, (3) email exchange, (4) tutoring.

EXCEL SPREADSHEET AND GIS APPLICATIONS

Some of the laboratory exercises will require spreadsheet (graphing and calculations) and GIS map production and data analysis. There will be tutorials set up during the semester in the computer lab for both EXCEL and GIS.

EXTRA CREDIT

You will have the opportunity to obtain extra credit points by hand texturing unknown soils. Other opportunities for extra credit may arise during the semester. Additional extra credit points may be assigned for unannounced quizzes during lecture, professionalism, class participation, and team work.

TENTATIVE TOPIC OUTLINE

1. The Soil and Water Around Us
2. Soil Formation
3. Physical Properties of Soil
4. Soil Air and Temperature
5. Soil and Water
6. Soil Colloids
7. Soil pH and Cation Exchange
8. Carbon and Nitrogen Cycles
9. Drainage Basins and Networks
10. Groundwater
11. Water Quality
12. Wetlands, Lakes and Streams
13. Nutrient Management
14. Erosion
15. Soil Quality
16. Chemical Movement
17. Water and Wastewater Treatment

NR251 LECTURE SECTION FOUR

UNIT 1: INTRODUCTION TO THE SOIL AND WATER AROUND US

Brady Chapter 1 is main source of material; also some snippets from Leopold.

1. Some basics about Earth: Size, thickness of interior zones, composition on the crust, composition of the atmosphere.
2. “The Spheres” – let’s not get too whacked out about them.
3. Water on earth: where it is, how it cycles, interaction of water and soil.
4. Definition of soil.
5. The five ecosystem functions of soil, with an emphasis on plants.
6. The essential nutrients for plants.
7. Soil, a three-phase system.
8. Soil horizons basics.
9. Soil water, soil air.
10. The soil quality concept.

NR251 LECTURE SECTION FOUR

UNIT 2: SOIL FORMATION

Brady Chapter 2 is main source of material.

1. Weathering of rocks and minerals. Some basics about mineral types. Weathering of primary minerals to make secondary minerals. Physical and biochemical weathering.
2. Factors of soil formation.
3. Factor 1: Parent material.
4. Factor 2: Climate.
5. Factor 3: Biota.
6. Factor 4: Topography (better: landscape positions).
7. Factor 5: Time.
8. The four basic processes of soil formation.
9. Soil horizons, soil profile descriptions.

NR251 LECTURE SECTION FOUR

UNIT 3: PHYSICAL PROPERTIES OF SOIL

1. The soil separates, their mineralogy, and some of their properties.
2. Soil texture, the textural triangle, soil properties by texture, determining texture.
3. Structure: type, size, grade. Importance, formation.
4. Soil density, particle density, bulk density, porosity. Importance.