

Grande Prairie Regional College  
Department of Science and Technology

**INTRODUCTION TO SOIL SCIENCE FO 1220  
(Winter 1999)**

Instructor:	Dr. C. Shang, Office J210; Tel: 539-2977
Prerequisite:	CH 1010 or approval by instructor
Transfer credits:	Soils 210, University of Alberta (in process)
Lecture:	Tuesday & Thursday 11:00 A.M. - 12:30 P.M., Room xxx
Laboratory:	Thursday 15:00 - 17:50 P.M.
Textbooks:	Brady, N. C. and R. R. Weil. 1996. The Nature and Properties of Soils. 11 <sup>th</sup> Edition. Prentice-Hall, Inc., A Simon & Schuster Company, Upper Saddle River, NJ.
Lab manual:	C. Shang. 1999. F1220 Lab Manual. GPRC.

## COURSE OUTLINE

1. Soil as a product of the environment
  - 1.1) Functions of soil
  - 1.1) Soil profile and horizon
  - 1.3) Descriptive properties: color, texture, and structure
  - 1.4) Soil as a three-phase system: bulk density, porosity, and water content
2. Soil water (liquid phase)
  - 2.1) Soil water energy concept and water potential
  - 2.2) Water movements in soil
  - 2.3) Soil water classification
  - 2.4) Plant-Soil water relationship
  - 2.5) Water budget
3. Soil air (gas phase) and soil temperature
  - 3.1) Soil aeration and redox processes
  - 3.2) Soil aeration management
  - 3.3) The balance of solar energy on the earth's surface
  - 3.4) Soil thermal properties and management
4. Soil colloids (inorganic solid phase)
  - 4.1) Soil clays and clay minerals
  - 4.2) The structure of clay minerals
  - 4.3) The properties of clay minerals
5. Soil organisms (living component)
  - 5.1) Types of soil organisms
  - 5.2) Microbial metabolism
  - 5.3) Earthworms and functions
  - 5.4) Soil fungi and actinomycetes
  - 5.5) Soil bacteria and functions
6. Soil organic matter (organic solid phase) and forest floor
  - 6.1) Introduction
  - 6.2) Components of soil organic matter
  - 6.3) Functions of soil organic matter
  - 6.4) Decomposition of plant residues
  - 6.5) Management of soil organic matter
  - 6.6) Forest floor and its classification
7. Soil chemical properties and problem soils
  - 7.1) Cation exchange and ion adsorption
  - 7.2) Acidity and acid soils
  - 7.3) Alkaline and salt-affected soils

8. Soil fertility
  - 8.1) Coupling of carbon and nutrient cycling
  - 8.2) Nitrogen, phosphorus and sulfur in soil
  - 8.3) Calcium, magnesium and potassium in soil
  - 8.4) Micronutrients in soil
  
9. Nutrient management
  - 9.1) Role of nutrients in plant nutrition
  - 9.2) Nutrient resources
  - 9.3) Inorganic chemical fertilizers
  - 9.4) Soil nutrition evaluation
  - 9.5) Fundamentals of fertilizer application
  
10. Soil genesis
  - 10.1) Rocks and minerals, and their weathering
  - 10.2) Glaciation and landforms
  - 10.3) Soil parent materials
  - 10.4) Soil formation and formation factors
  
11. Canadian system of soil classification (CSSC)
  - 11.1) History and concept of soil classification
  - 11.2) Soil horizons and the horizons used for identifying Alberta soils
  - 11.3) The structure of CSSC
  - 11.4) Soil groups in Alberta
  - 11.5) Soil surveys and maps
  - 11.6) Land capability classification
  
12. Land resources
  - 12.1) Soil erosion and pollution
  - 12.2) Soil information (GIS)

### 1999-WINTER LAB SCHEDULE

Lab no.	Date	Exercise
0	Jan 14	Introduction (Lab policy, drying soil samples, soil color)
1	Jan 21	Soil treatment, soil color
2	Jan 28	Soil structure, and preparation for soil texture analysis
3	Feb 4	Soil texture analysis
4	Feb 11	Soil water constants and water retention
5	Feb 18	Cation exchange capacity of soils
	March 4	<b>No lab</b>
6	March 11	Soil organic matter determination (Walkley-Black method)
7	March 18	Soil pH and electrical conductivity
8	March 25	Rocks, minerals, and parent materials
9	April 1	Description of soil profiles, and soil classification
10	April 8	Soil maps
	April 15	<b>Lab test</b>

### COURSE EVALUATION

	Number	% of total credit
Assignments	6	10
Mid-term quizzes	5	30
Laboratory exercises	10	25
Final exam	1	35

### ATTENDANCE POLICY

- 1) Students are encouraged to attend all the lectures.
- 2) Students are required to complete all lab exercises in order to earn the course credit.
- 3) A 20% of deduction will be applied to any delay.