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Grande Prairie Regional College
Department of Science and Technology

INTRODUCTION TO SOIL SCIENCE FO 1220 3(3-0-3)
(Winter 1999)

Instructor:	Anwar-ul-Haq
Prerequiste:	Introduction to Chemistry (CH 1010)
Lecture:	Tuesday & Thursday 18:00P.M.- 19:20P.M., Room B305
Laboratory:	Friday- 14:30P.M.-17:00P.M.
Textbooks:	Brady, N.C. and R.R. Weil. 1996, Elements of the Nature and Properties of Soils. Prentice-Hall, Inc., A Simon & Schuster Company, Upper Saddle River, NJ.

Calendar Description:

Fundamental concepts and process of soils are introduced. The course covers the physical and chemical properties of soil, fertility, soil biology, geomorphology, and the genesis and classification of soils.

COURSE OUTLINE

1. Soil as a product of the environment.
    - 1.1) Functions of soil.
    - 1.2)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 constituents (solid phase).
    - 2.1)Soil clays and clay minerals.
    - 2.2)The structure of clay minerals.
    - 2.3)The properties of clay minerals.
    - 2.4)Soil organic matter.

3. Soil organisms (living component).
    - 3.1)Types of soil organism.
    - 3.2)Microbial metabolism.
    - 3.3)Earthworms and functions.
    - 3.4) Soil fungi and actinomycetes.
    - 3.5)Soil bacteria and function.

4. Soil water (liquid phase).
    - 4.1)Soil water energy concept and water potential.
    - 4.2)Water movements in soil.
    - 4.3)Soil water classification.
    - 4.4)Plant-Soil water relationship.
    - 4.5)Water budget

5. Soil air (gas phase) and soil temperature.
    - 5.1)Soil aeration and redox processes.
    - 5.2)Soil aeration management.
    - 5.3)The balance of solar energy on the earth's surface.
    - 5.4)Soil thermal properties and management.

6. Soil chemical properties and processes.
    - 6.1)Cation exchange and ion adsorption.
    - 6.2)Acidity and acid soils.
    - 6.3)Alkaline and salt-affected soils.

7. Soil fertility.
    - 7.1)Carbon cycling.
    - 7.2)Nitrogen, phosphorus and sulfur.
    - 7.3)Calcium, magnesium and potassium.
    - 7.4)Micronutrients.
    - 7.5)Plant nutrition and fertilization.

8. Soil geomorphology.
    8.1)Physical background.
    8.2)Rocks and minerals, and their weathering.
    8.3)Glaciation and landforms.
    8.4)Soil parent materials.
    8.5)Soil formation and formation factors.

9. Canadian system of soil classification (CSSC).
    9.1)History and concept of soil classification.
    9.2)Soil horizons and the horizons used for identifying Alberta soils.
    9.3)The structure of CSSC.
    9.4)Soil groups in Alberta.
    9.5)Soil surveys and maps.

10. Land resources.
    10.1)Land capability classification.
    10.2)Soil erosion and pollution.
    10.3)Soil information (GIS).

LAB EXERCISES

1. Soil treatment, soil color, structure.
2. Air-dry moisture of soil samples, Soil texture analysis.
3. Soil texture analysis (hand-texturing and hydrometer-method).
4. Soil organic matter determination (Walkley-Black method).
5. Soil water constants and water retention.
6. Cation exchange capacity.
7. Soil pH and electrical conductivity.
8. Rocks, minerals, and parent materials.
9. Rocks, minerals, and parent materials.
10. Description of soil profiles, and soil classification.
11. Soil maps.

COURSE EVALUATION

	% of total
Assignments	5%
Mid-term exams	30%
Laboratory	25%
Final exam	40%

Grade	Marks (%)
9	90-100
8	80-89
7	74-79
6	66-73
5	56-65
4	50-55(pass)
3	45-49
2	36-44