SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: FOREST SOILS

CODE NO: FOR 219-3 SEMESTER: III

PROGRAM: ABORIGINAL RESOURCE TECHNICIAN/FORESTRY TECHNICIAN

AUTHOR: MARK HARVEY

DATE: AUGUST 1995 PREVIOUS OUTLINE DATED: JUNE 1994

APPROVED: _____ August 24, 1995
DEAN, SCHOOL OF SCIENCES & NATURAL RESOURCES — DATE

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TOTAL CREDIT HOURS: 48

I. PHILOSOPHY/GOALS:

This is an introductory soils course. Students will examine soil making processes, glacial geomorphology and soil profile development. Field site description and classification will be supplemented with soil lab analysis. The physical, chemical and biological properties of soils and site will be related to forest ecology, productivity, silvicultural and environmental concerns.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course students will be able to:

1. Describe the formation of and identify in the field and from aerial photos, landforms found in Ontario.

2. Using lab and field techniques, describe the major physical and chemical properties of soils including texture, colour, pH, bulk, density, organic matter content, soil fertility and cation exchange capacity.

3. Describe and classify common forest soil profiles using a standard soil pit and field guide.

4. Complete a comprehensive site analysis according to the Ontario Institute of Pedology and Ontario Ministry of Natural Resources guidelines.

5. Relate conditions of site to site productivity and forest management practices using soil maps, aerial photos, field and lab sampling and site description guide books.

FOREST SOILS — FOR 219-3

COURSE NAME — CODE NUMBER

III. TOPICS TO BE COVERED:

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
1	1	Rocks, Minerals and Weathering - identification of three major classes of rocks, and major minerals - weathering of rocks and minerals and soil forming processes
2	2	Glaciation and Glacial Deposits and Bedrock Formations - recognition of landforms - glacial history - soil characteristics of glacial deposits - relationships between forest growth potential and landforms
3	2	Forest Site Description - describing Site and Soils in the field - designing and implementing a forest soil and site survey - drainage and soil moisture classification in Ontario
4	2	Physical Properties of Soil - textural analysis, bulk density, particle density, porosity, structure, colour - field and lab assessment techniques of soil physical properties - relationships between forest site quality and physical properties

FOREST SOILS — FOR 219-3

COURSE NAME — CODE NUMBER

III. TOPICS TO BE COVERED: (cont'd)

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
5	2	Soil Profile Development, Mineral Soil Classification - differentiation of mineral soils into orders and great groups - parent material and the soil profile and soil forming processes
6	1	The Organic Soil Order and Forest Humus Classification - wetland classification - forest humus classification - organic soil classification - Von Post's Scale of Decomposition
7	2	Soil Water and Forest Hydrology - energy status of soil water and osmotic, matric and gravitational forces - soil moisture, plant, atmospheric relationships - measuring soil moisture, and soil moisture tension - growth and soil moisture
8	1	Chemical Properties of Soil - soil colloids and sources of negative charges - cation exchange capacity - soil acidity and alkalinity, and nutrient availability - soil acidification
9	1	Soil Organic Matter & Soil Biology - decomposition and distribution of organic matter in soils - soil microbes, mycorrhizae and nitrogen fixation - nutrient cycling - organic soils, peat lands and forest productivity - humus types and organic soil classification

FOREST SOILS — FOR 219-3

COURSE NAME — CODE NUMBER

III. TOPICS TO BE COVERED: (cont'd)

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
10	2	Soil Nutrients & Tree Growth - essential plant nutrients, deficiencies - relationship between soil physical - chemical properties and soil nutrient status - measuring soil fertility - milliequivalents, ppm, percentages and soil test results - commercial fertilizer analysis - fertilizer application, fertilizer calculations
11		Tests, Assignments and Participation

IV. METHODS OF EVALUATION:

Rocks, Minerals and Photos Test	10%
Texturing Test	10%
Group Project	20%
Term Test 1	20%
Term Test 2	35%
Participation	5%
	100%

GRADES:

A+	=	90 - 100%
A	=	80 - 89%
B	=	70 - 79%
C	=	60 - 69%
R	=	< 60%

Marks will be deducted using a sliding scale for overdue assignments. Assignment more than 5 school days overdue may not be accepted. Term Test II will be held during the final test week in December. Students must be sure to be present for this test and arrange transportation and Christmas vacation so they do not conflict with the test date. The final test schedule will be posted early in the semester.

FOREST SOILS	FOR 219-3
COURSE NAME	CODE NUMBER

V. REQUIRED STUDENT RESOURCES:

Ontario Institute of Pedology and University of Guelph, 1985. Field Manual for Describing Soils, 3rd Edition. O/P Pub. No. 85-3.

Harpstead, M.I., and Hole, F.D., 1980. Soil Science Simplified. Iowa State University Press. Ames, Iowa, U.S.A. 121 p.

Harvey, M.H. 1993. Forest Soils Study Guide, Second Edition. Sault College of Applied Arts and Technology.

VI. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

Canada Soil Survey Committee, Subcommittee on Soil Classification, 1978.

The Canadian System of Soil Classification Can. Dep. Agr. Publ. 1646. Supply and Services Canada, Ont. 164 pp.

Expert Committee of Soil Survey: The Canada Soil Information System (CanSis), Manual for Describing Soils in the Field, 1982, revised, 1983. J.H. Day, Editor. Land Resource Research Institute, Res. Branch, Agri. Can., Ottawa. 97 p. and Append.

Armson, K.A., 1977. Forest Soils: Properties and Processes. University of Toronto Press. 390 p.

Aerial photos of glacial lands 17 p.

FOREST SOILS — FOR 219-3

COURSE NAME — CODE NUMBER

VII. SPECIAL NOTES:

The laboratory Portion of the course will be completed using the following guideline. Some modification may be required due to weather, holidays, etc.

Week 1	- Introduction to soil profile analysis using a soil pit
Week 2	- Practice soil pit
Week 3	- Field Camp
Week 4	- Field Camp
Week 5	- Soil Texturing
Week 6	- Soil pit, project
Week 7	- Soil pit project
Week 8	- Texturing Test - Designing Soil Analysis for Project
Week 9, 10, 11	- Lab Analysis Project
Week 12	- Rocks, Minerals and Landforms
Week 13	- Landforms of Ontario - Aerial photo landform I.D.
Week 14	- Soil Drainage and Moisture Classification
Week 15	- Lab Test, Rocks, Minerals and Landforms
Week 16	- Soil fertility and fertilizers

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.