

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: FOREST SOILS

CODE NO: FOR 219-3 SEMESTER: III

PROGRAM: FORESTRY TECHNICIAN

AUTHOR: MARK HARVEY

DATE: JANUARY 1992 PREVIOUS OUTLINE DATED: MAY 1991

APPROVED: [Signature]
DEAN

Nov 22/91
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.

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III. TOPICS TO BE COVERED:

<u>TOPIC NO.</u>	<u>PERIODS</u>	<u>TOPIC DESCRIPTION</u>
1	1	<u>Rocks, Minerals and Weathering</u> <ul style="list-style-type: none">- identification of three major classes of rocks, and major minerals- weathering of rocks and minerals and soil forming processes
2	2	<u>Glaciation and Glacial Deposits and Bedrock Formations</u> <ul style="list-style-type: none">- recognition of landforms- glacial history- soil characteristics of glacial deposits- relationships between forest growth potential and landforms
3	2	<u>Forest Site Description</u> <ul style="list-style-type: none">- 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	<u>Physical Properties of Soil</u> <ul style="list-style-type: none">- 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

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

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
5	2	<p><u>Soil Profile Development, Mineral Soil Classification</u></p> <ul style="list-style-type: none"> - differentiation of mineral soils into orders and great groups - parent material and the soil profile and soil forming processes
6	1	<p><u>The Organic Soil Order and Forest Humus Classification</u></p> <ul style="list-style-type: none"> - wetland classification - forest humus classification - organic soil classification - Von Post's Scale of Decomposition
7	2	<p><u>Soil Water and Forest Hydrology</u></p> <ul style="list-style-type: none"> - 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	<p><u>Chemical Properties of Soil</u></p> <ul style="list-style-type: none"> - soil colloids and sources of negative charges - cation exchange capacity - soil acidity and alkalinity, and nutrient availability - soil acidification
9	1	<p><u>Soil Organic Matter & Soil Biology</u></p> <ul style="list-style-type: none"> - 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

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

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
10	2	<u>Soil Nutrients & Tree Growth</u> - 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		FINAL LECTURE/LABORATORY TEST

IV. METHODS OF EVALUATION:

Rocks, Minerals and Photos Test	10%
Texturing Test	10%
Project, Group Report	20%
Participation	10%
Term Test 1	20%
Term Test 2	30%
	<u>100%</u>

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.

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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.

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.

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

Aerial photos of glacial lands 17 p.

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 - Identification and characteristics of major soil forming rocks and minerals
- Week 2 - Formation and characteristics of landforms of Ontario.
- Aerial photo landform I.D.
- Week 3 - Lab test, on rocks minerals and landforms
- Soil texturing practice.

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VII. SPECIAL NOTES: (cont'd)

Weeks

4 & 5 - Soil pits and soil sampling part of group projects

Weeks

6 & 7 - Field School. Dates may be changed.

Week 8

- Texturing test.
- Start Lab analysis of soil samples part of group project.

Weeks 9,

10 & 11 - Lab Analyses, part of group project.

Week 12

- Soil moisture and drainage classification.

Week 13

- Soil fertility and fertilizers.

Week 14

- Soil maps and site classification.
- Group projects submitted for grading.

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.