

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE: INTRODUCTION TO SOIL SCIENCE**

**CODE NO. : NRT257 SEMESTER: 3**

**PROGRAMS: FOREST CONSERVATION TECHNICIAN, NATURAL  
ENVIRONMENT TECHNICIAN/TECHNOLOGY**

**AUTHOR: PAUL HAZLETT**

**DATE: Sept. 2015 PREVIOUS OUTLINE DATED: Sept. 2014**

**APPROVED: "Colin Kirkwood"**

**September 2015**

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**Dean**

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**DATE**

**TOTAL CREDITS: 3**

**PREREQUISITE(S): NONE**

**Hours/week: 3**

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***For additional information, please contact Colin Kirkwood;***

***Dean, Environment/Design/Business***

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## I. COURSE DESCRIPTION:

This is an introductory forest soils course which highlights the relationships between landforms, geology, soils and forest ecosystems. The course covers landform origin, description and identification. Soil profile development, soil classification and the fundamentals of the physical chemical and biological properties of forest soils are covered. Students collect soil samples in the field and determine chemical and physical properties in both the field and the laboratory. Students complete a major project comparing and contrasting the soil properties and forest characteristics of two different ecosystems.

## II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

### a) Learning Outcomes -

- dig soil pits in the field, analyze soil profiles and take soil samples
- conduct a soils field assessment and write a technical report
- work in the field and the soils laboratory as part of a team
- understand the significance of soil related properties and processes in forested ecosystems.

b) Learning Outcomes and Elements of Performance – Upon the successful completion of this course the student will demonstrate the ability to:

1. **Understand the relationships between minerals, rocks, geological processes and soil formation.**

#### Potential Elements of the Performance:

- identify three major classes of rocks
- describe the rock cycle.
- describe the relationships between soil and site characteristics and local bedrock geology.
- Identify soil forming factors

This learning outcome will constitute 10% of the course.

2. **Identify and describe common landforms.**

#### Potential Elements of the Performance:

- describe the recent glacial history of Ontario
- describe the characteristics of common landforms and relate these to forest ecosystems

- relate surficial geological characteristics to forest site conditions
- identify common landforms in the field
- use knowledge of surficial geology to support resource management decisions

This learning outcome will constitute 10% of the course.

**3. Describe the physical properties of soil and relate these to forest site conditions.**

Potential Elements of the Performance:

- determine and describe the texture, bulk density, colour of soils
- describe soil structure
- classify the coarse fragment portion of a soil profile
- identify mottles and gleying
- identify stratified and unstratified soil profiles
- identify soil horizons and measure depths in soil profiles
- relate physical soil properties to site conditions.

This learning outcome will constitute 20% of the course.

**4. Describe the chemical characteristics of soil and relate this to forest site conditions.**

Potential Elements of the Performance:

- determine soil pH and relate to site fertility
- describe the terms cation exchange capacity, buffering capacity, soil colloids
- interpret the results from a soil lab test
- read the analysis on a commercial fertilizer container
- list the environmental impacts associated with nutrient leaching
- list essential plant nutrients
- describe how essential plant nutrients are utilized by plants
- describe the nitrogen cycle
- relate soil nutrient regime to plant indicators and site productivity
- calculate soil fertility using milli equivalents and ppm

This learning outcome will constitute 20% of the course.

**5. Describe the biological characteristics of soil and relate this to forest site conditions.**

Potential Elements of the Performance:

- identify and explain the role of various soil organisms
- explain the role of mycorrhizal fungi in forest ecosystems

This learning outcome will constitute 10% of the course.

6. **Use soil profiles to determine site characteristics and classify soils.**

Potential Elements of the Performance:

- identify five common soil orders
- use the physical characteristics of soils to classify processes in soil profiles
- relate parent material to soil profile development

This learning outcome constitutes 10% of the course.

7. **Describe and classify organic soils and associated forest communities.**

Potential Elements of the Performance:

- classify organic layers on upland forest sites
- use humus classification in forest ecosystem classification
- list the role of organic materials in the ecology of forested site
- describe the role of soil organisms in forest ecosystems.
- use von Post's scale of decomposition to classify lowland organic soil types

This learning outcome constitutes 10% of the course.

8. **Understand the relationship between soil moisture content, plants and the atmosphere.**

Potential elements of the performance:

- describe the processes required to move water from soil through plants and into the air
- describe three types of soil moisture
- describe how water is used by plants

This learning outcome constitutes 10% of the course.

**III. TOPICS:**

1. Rocks, minerals, surficial geology
2. Physical properties of mineral and organic soils
3. Chemical properties of soils
4. Soil fertility and site productivity
5. Biological soil processes, soil organic matter
6. Soil classification
7. Organic soils
8. Soil water

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Ontario Centre for Soil Resource Evaluation. 1993. **Field manual for describing soils in Ontario**. 4th edition. Ontario Centre for resource evaluation. Publication no. 93-1, 62pp.

Harvey, M.H. **Forest soils study guide**, second edition. Sault College of Applied Arts and Technology

**V. EVALUATION PROCESS/GRADING SYSTEM:**

Assignment #1	10%
Test #1	15%
Texture test	10%
Soil feature lab test	10%
Group project	25%
Final exam	<u>30%</u>
	<u>100%</u>

<sup>1</sup> All assignments must be submitted at the start of class on the due date. There will be a 10% per day penalty for late assignments. Late assignments will not be accepted after that assignment has been marked and returned to the class.

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 - 59%	1.00

F (Fail)	49% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty	

## VI. SPECIAL NOTES:

### Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

## VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline