

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Soils Analysis

CODE NO. : NRT257 **SEMESTER:** Three

PROGRAM: Forest Conservation/Natural Environment Tech/Tny

AUTHOR:

DATE: Fall 2013 **PREVIOUS OUTLINE DATED:** N/A

APPROVED: "C.Kirkwood"

Dean DATE

TOTAL CREDITS: 3

PREREQUISITE(S): NONE

HOURS/WEEK: 3

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**For additional information, please contact C.Kirkwood, Dean,
School, Environment/Design/Business
(705) 759-2554, Ext. 2688**

I. **COURSE DESCRIPTION:**

This is an introductory soils course that prepares students to understand the relationships between landforms, geology and soils and forest ecosystems.

II. **LEARNING OUTCOMES AND ELEMENTS OF PERFORMANCE:**

a) Learning Outcomes -

- Dig a soils pit in the field and analyze soil profile
- Conduct a soils field assessment and use this to write a technical report
- Work in the field and the soils lab as part of a team
- Use standard manuals and keys to determine site characteristics and use ecological classification
- 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 rocks and minerals and geological processes and soils.

Potential elements of the performance:

- Identify 3 major classes of rocks
- Identify and describe 25 very common rocks and minerals found in Ontario
- Using labeled diagrams complete the rock cycle
- Determine the relationships between soil and site characteristics and local surficial geology

This learning outcome will constitute about 5-10% of the course's possible grade.

2. Identify and describe common landforms

Potential elements of the performance:

- Briefly describe the recent glacial history of Ontario
- Describe the characteristics of common landforms and relate these to forest ecosystems
- Identify from aerial photos common landforms
- Identify common landforms in the field
- Use landforms identification and characteristics to support resource management decisions

This learning outcome will constitute 15% of the course grade.

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

Potential elements of the performance:

- Determine the textural class of soils
- Determine the bulk density of soils
- Determine soil colour
- Determine soil structure
- Classify the coarse fragment portion of a soil profile
- Identify mottles
- Identify stratified and unstratified soil profiles
- Measure depths and thickness in soil profiles
- Collect soil samples for lab analysis
- Relate physical soil properties to conditions of site

This learning outcome will constitute 20% of course grade.

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

Potential elements of the performance:

- Determine soil pH
- Interpret the results from a soil lab test
- Relate soil pH to forest fertility
- Read the analysis on from a commercial fertilizer
- Classify types of fertilizers and select a specific fertilizer using soil lab test
- List the environmental impacts associated with nutrient leaching
- Describe using diagrams the nitrogen cycle
- Relate soil nutrient regime to vegetation and productivity
- Apply fertilizer to trees
- Given data, calculate commercial fertilizer rates for forest trees
- Given data, calculate soil fertility using millequivalents and ppm

This learning outcome will constitute 10% of the course grade.

5. Use soil profiles to determine site characteristics and to classify soils.

Potential elements of the performance:

- Identify five common soil types at the order level
- Use the physical characteristics of soils to classify processes in soil profiles
- Use soil profile analyses in forest ecosystem classification
- Relate parent material to soil profile development
- Relate parent material to site conditions

This learning outcome constitutes 10% of the course grade.

6. Describe and classify organic soils and list characteristics of forest sites on organic soils. Demonstrate the role soil organisms play in forest ecological processes.

Potential elements of the performance:

- Using diagrams show the relationships between the properties of soil and nutrient status
- List at least 10 soil related factors that effect the long term productivity in forests with timber extraction
- List at least 8 good practices that can be used to help ensure the long term productivity of harvested forests
- Visit a recently harvested forest and audit forest operations to determine if sustainable forestry practices are being practiced in terms of soil. Identify both good and bad practices.

This learning outcome constitutes 10% of the course grade.

7. Conduct a field analysis to determine soil moisture content and classify site by moisture regime.

Potential elements of the performance:

- Use soil characteristics and keys to determine soil/site moisture regimes
- Measure soil moisture
- Use soil moisture regimes to support forest management decisions
- Relate soil moisture and drainage to the conditions on forest sites
- Understand the relationship between soil moisture and plant growth processes

This learning outcome constitutes 10% of the course grade.

8. Develop a framework for understanding how soil and other site factors interact to effect growth and productivity in the forest.

Potential elements of the performance:

- List essential plant nutrients
- Using diagrams show the relationships between the properties of soil and nutrient status
- List at least 10 soil related factors that effect the long term productivity in forests with timber extraction
- List at least 8 good practices that can be used to help ensure the long term productivity of harvested forests
- Visit a recently harvested forest and audit forest operations to determine if sustainable forestry practices are being practiced in terms of soil. Identify both good and bad practices.

This learning outcome constitutes 10% of the course grade.

9. Use provincially and nationally recognized manuals and techniques to ecologically classify forested sites with respect to soil.

Potential elements of the performance:

- Use keys in Fec manuals to classify soil type
- Use soil type information in fec manuals as a resource for making decisions in resource management

This learning outcome constitutes 5% of the course grade.

III. TOPICS:

1. Rocks, minerals, surficial geology
2. Physical properties of soils
3. Chemical properties of soils
4. Biological soil processes
5. Site classification and soils
6. Soil classification
7. Organic soils
8. Humus
9. Soils and water
10. Soil fertility
11. Soils and site productivity

IV. REQUIRED RESOURCES / TEXTS / MATERIALS:

1. 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.
2. Gagnon, Peter. Forest soils study guide, second edition. Sault College of Applied Arts and Technology. Campus shop.
3. Gagnon, Peter Forest Soils Field Exercises and Lab notes-4.

V. EVALUATION PROCESS / GRADING SYSTEM:

Major Assignments and Testing

- | | |
|--------------------------------------|-----|
| 1. Group technical report | 20% |
| 2. Rocks minerals and landforms test | 10% |
| 3. Texturing test | 10% |
| 4. Term test #1 | 25% |
| 5. Term test #2 | 35% |

Marks will be deducted using a sliding scale for overdue assignments. Assignments more than 4 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.

STUDENTS MUST ATTEND 80% OF THE LABS TO RECEIVE A “C” GRADE OR HIGHER.

VI. SPECIAL NOTES:

The laboratory portion of the course will be completed using the following guidelines. Some modifications may be required due to weather, holidays, etc.

- | | |
|------------------|--|
| Week 1 | - Introduction to soil profile analysis using a soil pit |
| Week 2 | - Field Camp |
| Week 3 | - Field Camp |
| Week 4 | - Practice soil pit |
| Week 5 | - Soil testing |
| Week 6 | - Soil pit project |
| Week 7 | - Soil pit project |
| Week 8 | - Texturing test
Designing Soil Analysis for Project |
| Weeks 9, 10 & 11 | - Lab Analysis Project |
| Week 12 | - Rocks, minerals and landforms |
| Week 13 | - Landforms of Ontario – Aerial photo landforms I.D. |
| Week 14 | - Soil drainage and moisture classification |
| Week 15 | - Lab test, rocks, minerals and landforms |
| Week 16 | - Soil fertility and fertilizers |

The following semester grades will be assigned to students:

<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% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
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

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Special Needs

If you are a student with special needs (eg. Physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1240, Ex. 493, 717 or 491 so that support services can be arranged for you.

Plagiarism

Students should refer to the definition of ‘academic dishonesty’ in the “Statement of Students Rights and Responsibilities.”

Students who engage in ‘academic dishonesty’ will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course, as may be decided by the professor.

In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Advanced Standing

Students who have completed an equivalent post-secondary course should bring relevant documents to the Coordinator, Natural Resources Programs.

Retention of Course Outlines

It is the responsibility of the student to retain all course outlines for possible future use in gaining advanced standing at other post-secondary institutions.

Substitute course information is available at the Registrar’s Office.

VII. PRIOR LEARNING ASSESSMENT:

Please contact the Prior Learning Assessment Office for further information.