

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** Forest Soils  
**CODE NO. :** NRT 219 **SEMESTER:** 3  
**PROGRAM:** Forestry Technician  
**AUTHOR:** Mark Harvey  
**DATE:** Aug 2005 **PREVIOUS OUTLINE DATED:** 2004  
**APPROVED:**  
\_\_\_\_\_  
**DEAN** **DATE**  
**TOTAL CREDITS:** 3  
**PREREQUISITE(S):**  
**HOURS/WEEK:** 3

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**I. COURSE DESCRIPTION:**

This is an introductory forest soils course which discusses the relationships between landforms, geology, soils and forest ecosystems. The course covers landform origin, description and identification. Soil profile development and soil classification and the fundamentals of the physical and chemical properties of forest soils. Students collect soil samples and analyze them in both the field and the laboratory and then determine the soil classification, physical, chemical and biological properties. Forest ecosystem classification is introduced. Students complete a major project comparing and contrasting the biophysical elements of two different ecosites.

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

Upon successful completion of this course, the student will demonstrate the ability to:

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

Potential Elements of the Performance:

- identify 3 major classes of rocks
- identify and describe 25 very common rocks and minerals found in Ontario
- describe the rock cycle.
- describe the relationships between soil and site characteristics and local surficial geology.

This learning outcome will constitute 10% of the 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
- 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
- identify and describe the significance of stratified soil profiles
- measure depths and thickness 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
- 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 10% of the course.

**5. 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
- use soil profile analyses in forest ecosystem classification
- relate parent material to soil profile development

This learning outcome constitutes 10% of the course.

**6. 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
- classify wetlands and list associated characteristics

This learning outcome constitutes 10% of the course.

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

Potential elements of the performance:

- use soil characteristics and keys to determine soil/site moisture regime and soil moisture
- recognize mottles
- relate soil moisture regime to sustainable forest management decisions
- relate soil moisture and drainage to site productivity

This learning outcome constitutes 10% of the course.

**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
- describe the relationships between the biophysical properties of soil and nutrient status
- list a least 10 soil related factors that effect the long term site productivity in commercial (harvested) forests
- list at least 8 practices that can be used to help ensure the long term productivity of harvested forests

This learning outcome constitutes 10% of the course.

9. **Use provincially and nationally recognized manuals and techniques to classify forested sites**

Potential elements of then performance:

- use soil texture/drainage keys in FEC manuals to classify soil type
- use soil type information in FEC and Ecosite manuals for making decisions in resource management.
- Determine the “S” type using ecological soil classification keys

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. Biological soil processes
5. Ecological site classification
6. Soil fertility and site productivity
7. Soil Classification

**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

Harvey, M.H. **Forest soils field exercises and lab notes** Sault College of Applied Arts and Technology

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

|  |            |
|--|------------|
| texturing test                             | 10%        |
| assignment # 2 page 10- 24 study guide     | 10%        |
| term test #1 ( study guide units 1-3)      | 20%        |
| term test #2 ( study guide units 4-11)     | 20%        |
| soils group project including field school | 20%        |
| rocks and minerals test                    | 10%        |
| field trip report                          | <u>10%</u> |
|  | <hr/> 100% |

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:

### Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1104 or call Extension 703 so that support services can be arranged for you.

### Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student 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/program, as may be decided by the professor/dean. 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.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

Health and Safety:

Conducting soil surveys in rough terrain and in inclement weather is physically demanding. The use of soil and site classification aids poses a significant thinking challenge. It is the responsibility of the student to discuss any potential difficulties with the Learning Assistance Centre. Students must wear appropriate safety gear during field operations (hardhats and safety boots as a minimum) and dress appropriately for the weather. The professor will determine the safety equipment requirements for all field trips.

Use of safety gear is mandatory while in attendance on field trips.

Attendance: Students

Students must attend 80% of the SCHEDULED class time to achieve a **D** grade or better. Field trips are mandatory. Students who arrive late for class may miss courseware materials a test or miss an entire field trip. Students are responsible for completing missed material, tests and field trips on their own time and at their own expense. Special circumstances may apply.

Rewrites/Supplementary Exams:

There will be no rewrites/supplementary exams in this course.

Assignments and tests:

All assignments must be submitted on time, or be penalized 10% of the total mark per day including weekends. Check each assignment for the due date and time. The course schedule with important dates will be handed to students in the first class and posted in the classroom

Reports must be word-processed, double-spaced and follow other formatting specifications outlined by the professor.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.