

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE


COURSE TITLE: SOIL ANALYSIS

CODE NO. : NRT257 SEMESTER: 3

PROGRAMS: FOREST TECHNICIAN, NET

AUTHOR: PETER GAGNON R.P.F.

DATE: Sept. 2012 PREVIOUS OUTLINE DATED: Sept.2011

APPROVED:  **September 2012**

CHAIR DATE

TOTAL CREDITS: 3

PREREQUISITE(S): NONE

Hours/week: 3

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**For additional information, please contact Brian Punch, Chair, Environment and Design
School of Environment and Design
(705) 759-2554, Ext. 2681**

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 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 three 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 bedrock 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
- 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
- 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
- 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 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
- 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:

- 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

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V. EVALUATION PROCESS/GRADING SYSTEM:

| | |
|--|------------|
| texturing test | 10% |
| rocks and minerals test | 10% |
| term test #1 (study guide units 1-3) | 20% |
| assignment # 2 page 10- 24 study guide | 10% |
| term test #2 (study guide units 4-11) | 25% |
| soils group project | <u>25%</u> |
| | 100% |

¹ 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.

² Students may miss some or all of two scheduled 3-hour classes without penalty. Further absence will result in a deduction of 5 marks per missed class up to a maximum of 15 marks. Students must be present for the beginning and end of a class to be counted as present.

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:

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.

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.

Prior Learning Assessment:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

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

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

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Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade “C”, (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. 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.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations, in addition to announcements, news, academic calendar of events, class cancellations, your learning management system (LMS), and much more. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

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. *It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers may not be granted admission to the room.*

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Tuition Default:

Students who have defaulted on the payment of tuition (tuition has not been paid in full, payments were not deferred or payment plan not honoured) as of the first week of *November* will be removed from placement and clinical activities. This may result in loss of mandatory hours or incomplete course work. Sault College will not be responsible for incomplete hours or outcomes that are not achieved or any other academic requirement not met as of the result of tuition default.

Students are encouraged to communicate with Financial Services with regard to the status of their tuition prior to this deadline to ensure that their financial status does not interfere with academic progress.

Students are expected to attend all classes . Students may be exempted from completing tests and assignments for compassionate/health related reasons at the discretion of the course professor. Hunting, visiting friends and relatives and assisting in the teaching or instruction of courses taught by the college or other forms of employment are not acceptable reasons for missing classes. Students who choose to miss classes for unacceptable reasons should expect this to effect their final grade.