COURSE OUTLINE: NRT257 - INTRO SOIL SCIENCE

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Approved: Karen Hudson, Dean, Community Services and Interdisciplinary Studies

Course Code: Title	NRT257: INTRODUCTION TO SOIL SCIENCE
Program Number: Name	5220: NAT ENVIRONMENT TN 5230: FORESTRY TECHNICIAN
Department:	NATURAL RESOURCES PRG
Academic Year:	2024-2025
Course Description:	This forest soils course 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 complete a major project comparing and contrasting the biophysical elements of two different eco-sites.
Total Credits:	3
Hours/Week:	3
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Substitutes:	NRT219
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**5220 - NAT ENVIRONMENT TN** VLO 1 Collect data from representative biological and environmental samples using routine test procedures. VLO 2 Utilize natural resources equipment and technology to accurately identify ecosystem components for purposes of conserving and managing natural resources. VLO 3 Apply the basic concepts of science to natural resource conservation and management. VLO 4 Conduct natural environment assessments according to standard field survey methods, including the use of appropriate equipment and materials. VLO 7 Work safely in adherence to occupational health and safety standards. VLO 11 Communicate technical information accurately and effectively in oral, written and visual forms. **5230 - FORESTRY TECHNICIAN** VLO 1 Conduct forest inventory surveys and field measurements to determine forest resources and values in forests and woodlots. VLO 2 Assess soil characteristics, vegetation and wildlife habitats to identify their interactions within forest ecosystems. VLO 7 Select, operate, troubleshoot and maintain tools and equipment in a variety of

		environmental conditions and in accordance with safety and operating standards.
	VLO 8	Work independently and in a collaborative environment while applying effective teamwork, leadership and interpersonal skills.
Essential Employability Skills (EES) addressed in this course:	EES 1	Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
	EES 2	Respond to written, spoken, or visual messages in a manner that ensures effective communication.
	EES 4	Apply a systematic approach to solve problems.
	EES 5	Use a variety of thinking skills to anticipate and solve problems.
	EES 7	Analyze, evaluate, and apply relevant information from a variety of sources.
	EES 9	Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.
	EES 10	Manage the use of time and other resources to complete projects.
	EES 11	Take responsibility for ones own actions, decisions, and consequences.
General Education Themes:	Science and Technology	
Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.	
Other Course Evaluation & Assessment Requirements:	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. Academic success is directly linked to attendance. Missing more than 1/3 of course hours in a semester shall result in an F Grade for the course.	
Books and Required Resources:	Characterizing Sites, Soils & Substrates in Ontario by Heck,R.J, Kroetsch, D.J., Lee, H.T., Leadbeater, D.A., Wilson, E.A. and Winstone, B.C Publisher: School of Environmental Sciences, University of Guelph. Edition: 2017 Volume 1 Field Description Manual. Forest Soils Study Guide by Harvey, M.H. Publisher: Sault College of Applied Arts and Technology Edition: 2	

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Understand the relationships between minerals, rocks, geological processes and soil formation.	1.1 Identify three major classes of rocks. 1.2 Describe the rock cycle. 1.3 Describe the relationships between soil and site characteristics and local bedrock geology. 1.4 Identify soil forming factors.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Identify and describe common landforms.	2.1 Describe the recent glacial history of Ontario. 2.2 Describe the characteristics of common landforms and relate these to forest ecosystems.

	2.3 Relate surficial geological characteristics to forest site conditions. 2.4 Identify common landforms in the field. 2.5 Use knowledge of surficial geology to support resource management decisions.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Describe the physical properties of soil and relate these to forest site conditions.	3.1 Determine and describe the texture, bulk density, colour of soils. 3.2 Describe soil structure. 3.3 Classify the coarse fragment portion of a soil profile. 3.4 Identify mottles and gleying. 3.5 Identify stratified and unstratified soil profiles. 3.6 Identify soil horizons and measure depths in soil profiles. 3.7 Relate physical soil properties to site conditions.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Describe the chemical characteristics of soil and relate this to forest site conditions.	4.1 Determine soil pH and relate to site fertility. 4.2 Describe the terms cation exchange capacity, buffering capacity, soil colloids. 4.3 Interpret the results from a soil lab test. 4.4 Read the analysis on a commercial fertilizer container. 4.5 List the environmental impacts associated with nutrient leaching. 4.6 List essential plant nutrients. 4.7 Describe how essential plant nutrients are utilized by plants. 4.8 Describe the nitrogen cycle. 4.9 Relate soil nutrient regime to plant indicators and site productivity. 4.10Calculate soil fertility using milli equivalents and ppm.
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Describe the biological characteristics of soil and relate this to forest site conditions.	5.1 Identify and explain the role of various soil organisms. 5.2 Explain the role of mycorrhizal fungi in forest ecosystems.
Course Outcome 6	**Learning Objectives for Course Outcome 6**
6. Describe and classify organic soils and associated forest communities.	6.1 Classify organic layers on upland forest sites. 6.2 Use humus classification in forest ecosystem classification. 6.3 List the role of organic materials in the ecology of forested site. 6.4 Describe the role of soil organisms in forest ecosystems. 6.5 Use von Post`s scale of decomposition to classify lowland organic soil types
Course Outcome 7	**Learning Objectives for Course Outcome 7**
7. Use soil profiles to determine site characteristics and classify soils.	7.1 Identify five common soil orders. 7.2 Use the physical characteristics of soils to classify processes in soil profiles. 7.3 Relate parent material to soil profile development.

Course Outcome 8	Learning Objectives for Course Outcome 8
8. Understand the relationship between soil moisture content, plants and the atmosphere.	8.1 Describe the processes required to move water from soil through plants and into the air. 8.2 Describe three types of soil moisture. 8.3 Describe how water is used by plants.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignment #1	10%
Assignment #2	10%
Draft Lab Report	5%
Final Exam	20%
Final Lab Report	15%
Soil Feature Lab Test	15%
Test #1	15%
Texture Test	10%

Date: June 21, 2024

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.