



VANCOUVER ISLAND  
UNIVERSITY

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SCIENCE & TECHNOLOGY

FORESTRY

## Forest Resources Technology Program

### Soil Science - Forest Soil I

Forestry 151

#### Course Outline

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**Term:** Fall  
**Lectures/Labs:** TBA

**Instructor:** TBA

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#### CALENDAR DESCRIPTION

This course is an introduction to soil science with a ***focus on soil physical characteristics and properties***; an understanding of the relationship between soil and the forest environment will be emphasized. Students will be introduced to basic geology and geomorphology and their role and influence on soil make-up, development, and physical properties. We will also discuss how soil science can be used to guide forest and environmental management decisions; we will consider forest practices and their potential effects on soil productivity and, measures that can be used to prevent or minimize site degradation or reduced productivity.

#### SCOPE AND CREDIT

This course has a 1.5 credit value and is required for graduation in the Forest Resources Technology program; it is a prerequisite to FRST 152, FRST 234 and FRST 231

#### COURSE FORMAT

This course is intended and designed for first year forestry students and those pursuing an undergraduate degree in environmental sciences and or forestry. The term will consist of one hour of lecture and a two hour lecture/lab session per week but this may vary from week to week.

## **LEARNING OUTCOMES**

On successful completion of this course, students will be able to:

1. Assess the potential hazards of working in the forest; demonstrate safe work procedures for carrying out tasks, and use appropriate personal protective equipment requirements and describe emergency procedures.
2. Define and use the technical terms applicable to forest soils in conversation with peers and when consulting technical reports.
3. Describe the origin and development of soils and their relative importance in our natural environment.
4. Recognize and describe, in the field, soil physical characteristics including texture, % coarse fragment content, horizon configuration, structure, restrictive layers, colour, drainage and soil moisture status.
5. Describe and determine soil particle density, bulk density, and porosity; describe the implications of altering soil bulk density and porosity resulting from poor harvesting practices on plant establishment and growth; *recognize soils sensitive to compaction and puddling and develop recommendations to minimize soil compaction and puddling.*
6. Describe the origin of rocks and minerals, and be able to identify common rock types found in British Columbia.
7. Describe the principles of mechanical and chemical weathering, geomorphological processes and the development of landforms common to British Columbia; recognize and describe the types and physical characteristics of parent materials; develop basic management, road construction, and silviculture prescriptions and strategies relative to parent material types.
8. Explain pedogenic processes and their role in soil development.
9. Describe the sensitivity of soils, substrates, and forest environments to instability, and identify erosion and mass wasting potential.
10. Describe the Canadian System of Soil Classification and the basis of the system; list the soil orders and their significant diagnostic properties; describe to the Sub-Group level, coastal Orders such as Brunisols and Podzols.

In addition to the subject-specific learning outcomes listed above, specific program learning outcomes will be covered. Upon successful completion of this course students will have furthered their ability to:

- **Develop independent learning skills;** students will be required to carry out independent research on a specific soil physical property and submit a short report.
- **Learn to resolve issues and conflicts** by assessing a specific site degradation event and recommending procedures to avoid repeating it.
- **Analyze soil information and think critically;** students will be required to assess a soil's compaction potential and recommend forest harvesting practices that may result in reduced growth potential.

## **REFERENCES**

Most of the information that you will require will be available as instructional handouts. However, a great deal of additional information is available on specific topics of geology, soils, hydrology and ecology in the school library. In addition, you may chose to supplement lecture notes with information from the following:

- Soil Landscapes in B.C., 1978, MoE
- Brady, N. C., Weil, R. R., 1999. The Nature and Properties of Soils. 12<sup>th</sup> ed. Prentice Hall, Upper Saddle River, NJ. 881 pp.
- Pritchett, W.L., Fisher, R. F., 1987. Properties and Management of Forest Soils, 2<sup>nd</sup> ed. John Wiley & Sons, New York. 494 pp.
- Terrain Classification System, 1978, MoE
- Forestry Handbook
- The identification of common rocks  
[Information circular 1987-5]  
Mineral Resources Division  
Geological Survey Branch - BC Government

## **TEXTS & SUPPLIES**

Field equipment and drafting supplies, as used in Forestry 131T & Forestry 111T, must be available.

Students should consider purchasing the following...

- **SOILS ILLUSTRATED - Field Descriptions, 2007 (Revised 2009)  
First Edition by Kent Watson**

## **EXAMS**

There will be one mid-term and one final exam.

## **EVALUATION (sample)**

Grade Breakout:

- |                                |      |
|--------------------------------|------|
| • Midterm                      | 25%  |
| • Final exam                   | 30%  |
| • Spot quizzes <sup>1</sup>    | 10%  |
| • Professionalism <sup>2</sup> | 10 % |
| • Labs <sup>3</sup>            | 25 % |

<sup>1</sup> There will be two spot quizzes during the term, each worth 5%.

<sup>2</sup> Explanation and grading rubric can be found on the D2L Forestry Portal.

<sup>3</sup> Students must complete both the laboratory and written portions of each lab assignment; students not personally completing both parts will receive a zero grade for the lab.

**Students must complete all labs!**

**Grading Scale (Letter Grade and Mark Equivalence) can be found in the D2L Forestry Portal.**

**Academic Policies:**

For information on exam policies, missing tests, assignment format standards, late assignments, instructor assessment and academic misconduct (e.g., plagiarism), please refer to the VIU Forestry Department website:

<https://www2.viu.ca/forestry/Current-Students/VIU-Policies/index.asp>

or the Forestry Portal on D2L

**Critical dates:**

September	2 <sup>nd</sup> year field trip time transferred to other course and self-directed learning
October	Teacher away – the soil science time slots for the week will be exchange with other faculty members for time later on in the semester.
<b>October</b>	<b>Midterm exam</b>
November	Remembrance Day
December	Last of classes

**Topics to be covered:**

**Module # 1 - Introduction to soil science**

- Soil as an integral component of our natural environment
- The function of soil in our environment
- Use of soil science as a tool in forest resource management
- Soil as a source of nutrients essential to plant growth
- Soil as a dynamic and changing medium

**Module # 2 - Chemistry and soil science**

- Understanding basic principles of chemistry that apply to soil science

**Module # 3 - Soil Physical Properties**

- Communicating soil information
- Describing soil using its soil physical properties
  - i. Texture
  - ii. Coarse Fragment Content
  - iii. Horizons
  - iv. Colour
  - v. Structure and Ped development
  - vi. Porosity
  - vii. Bulk Density
  - viii. Particle Density
  - ix. Effervescence and acidity
  - x. Restrictive layers

**Module # 4 - Introduction to geology**

- Rock forming minerals
- The origins of rocks, the rock cycle and the classification of rocks
- Igneous, sedimentary and metamorphic rocks

**Module # 5 - Weathering and Surficial Geology, Geomorphology, Landforms, and Parent Materials common to BC**

- Physical and chemical weathering processes
- Water, ice, wind, and gravity and geological processes in landform development
- Landforms and surficial materials
- Recognizing different landforms using their appearance and their physical properties

**Module # 6 - Soil Genesis and profile development**

- The factors that influence soil development
- The processes of soil development

**Module # 7 Soil classification system for Canada**

- Relative importance of classification systems
- Basis of the classification system at the Order and Great Group level
- Soil Orders and their diagnostic characteristics
- Characteristics of forest soils common to BC with emphasis on...
  - o Brunisols
  - o Podzols
  - o Luvisols

**Module # 8 - Slope and Terrain Stability**

- Dynamics of slope instability
- Factors that influence instability
- Recognizing clues to instability
- Describing unstable slopes and terrain