

**ENVS\*2060 Soil Science**

Fall 2018

Section(s): C01

School of Environmental Sciences Credit Weight: 0.50

Version 1.00 - September 04, 2018

# Course Details

## Calendar Description

This course is an introduction to the principles of soil science - the origin of soils, their classification and interpretation in natural and modified environments. Soil will be studied as a product of the natural environment, with a focus on formation processes and changes which occur when it is modified through use. A variety of uses including agriculture, forestry, recreation, and urban development will be considered.

### Equate(s): Restriction(s):

* 1. **Course Description**

SOIL\*2010 AGR\*2320.

The course will provide an introduction to the nature and properties of soil, and use this information to understand management practices that will sustain the productivity of these resources and enhance the quality of the ecosystems of which they are a part. The course will be presented in a lecture-lab-tutorial manner, with 3 lectures and a 2-hour lab-tutorial per week. The laboratory will provide an opportunity to reinforce concepts discussed in the lecture through observations, selected exercises and assigned reading. In addition, students working in groups will evaluate a parcel of land, taking into account the roles of geological, landscape, drainage, biological, climatic, and temporal factors on the formation, properties and uses of the soils that they have identified at the site.

## Timetable

**Lectures:** Tuesday and Thursday 8:30 - 9:50 ALEX 200

**Labs:** Alexander Hall, Room 030, Monday 3:30 – 5:20

Alexander Hall, Room 030, Wednesday 10:30 – 12:20

Alexander Hall, Room 030, Wednesday 12:30 – 2:20

Alexander Hall, Room 030, Wednesday 2:30 – 4:20

Alexander Hall, Room 030, Friday 2:30 – 4:20

## Final Exam

02:30PM - 04:30PM (2018/12/14)

Room TBA

# Instructional Support

## Instructor(s)

### John Lauzon Email: Telephone: Office:

[lauzonj@uoguelph.ca](mailto:lauzonj@uoguelph.ca)

+1-519-824-4120 x52459

ALEX 219

# Learning Resources

## Recommended Resource(s)

### The nature and properties of soils (Textbook)

Brady, N.C. and R.R. Weil. 2017. 15th ed. (note the 12th – 14th ed. Are also OK) Prentice Hall. Upper Saddle River, New Jersey. Copies of the 12th – 14th editions are available on course reserve

### The Canadian System of Soil Classification (Textbook)

Agriculture Canada. 1998. 3rd ed. Canada Soil Survey Committee, Research Branch, Agriculture Canada, Ottawa. Available at: <http://sis.agr.gc.ca/cansis/publications/manuals/1998-cssc-ed3/cssc3_manual.pdf>

## Other Resources

* + - Other assorted papers to be listed on the course reserve, online resources listed on CourseLink, and in the laboratory outlines.
    - Please view Courselink regularly for course slide sets and other useful materials and information. The textbook can be found on the course reserve at the library

# Learning Outcomes

## Course Learning Outcomes

By the end of this course, you should be able to:

1. An introductory understand of how soils form gathered from information provided in lectures and laboratories
2. Be able to describe a soil profile from information in the lectures and laboratories as well as study of a specific field study (major project)
3. An introductory understanding of the Canadian system of classification focusing on the soil orders gathered from information provided in lectures and laboratories.
4. Have an introductory understanding of the geology of Southern Ontario important for soil formation from information in the lectures and laboratories as well as study of a specific field study (major project)
5. An introductory understanding of the physical nature of soil from information in the lectures and laboratories as well as study of a specific field study (major project)
6. An introductory understanding of water behavior, availability and budgeting in soils
7. An introductory understanding of soil chemical properties (clay mineralogy, Cation exchange and pH) gathered from information provided in lectures and laboratories
8. An introductory understanding of plant macronutrient cycling in soils gathered from information provided in lectures and laboratories
9. An introductory understanding of resource use and management from information in the lectures and laboratories as well as study of a specific field study (major project)
10. Apply the knowledge and understand the implications of the knowledge gained in learning objectives 1- 9 for sound management of a soil through the compilation of the major project
11. Apply the knowledge gained in learning outcomes 1 – 9 to collect, compile and report on the nature of a selected study site through the compilation of the major project

# Teaching and Learning Activities

## Lecture

### Unit 1

**Topic(s):**

**Unit 2**

Introduction

### Topic(s):

Soil Characteristics

### Reference(s):

Sections 4 – 4.4 of Brady and Weil 13th to 15th ed

* + - Composition of soils

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### Unit 3

Soil description

Soils in the landscape

### Topic(s):

**Unit 4**

Additional information provided for the project

### Topic(s):

Soil Developments and Classification

### Reference(s):

The Canadian System of Soil Classification, 3rd edition

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### Unit 5

Soil development

Principles of soil classification

The Canadian system of classification

Implications for identifying land use/management options

### Topic(s):

Soil Physical Properties

### Reference(s):

Weil and Brady 15th ed pages130 -155, 161 - 175 All editions - Sec 4.0 – 4.5, 4.7 – 4.8

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### Unit 6

Texture

Structure (bulk density, influence of mgt

Implications for identifying land use/management options

### Topic(s):

Soil Water

### Reference(s):

Weil and Brady Chapters 5.0 - 5.9 and 6.0 - 6.3, 6.6-6.7, 6.9

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### Unit 7

Characteristics of water molecule influencing its behavior in soil Water potential

Water content Water release curve Water flow

Water available to plants

Implications for identifying land use/management options

### Topic(s):

Chemical and Mineralogical Characteristics of Soils

### Reference(s):

Weil and Brady 8.1 – 8.3, 8.6, 8.8, 8.9,

chapter 9,

Chapter 11 – 11.6, 11.8 – 11.10

Chapter 12 – 12.3, 12.7

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### Unit 8

Clay minerals pH

Organic matter

### Topic(s):

Plant Nutrients

### Reference(s):

Weil and Brady Chapter 13.0 -13.15

Chapter 14

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### Unit 9

Macro versus micro nutrients

N cycle, organic N sources, fertilizer N P cycle, fertilizer P

K cycle, K fertilizer Deficiency symptoms

Estimating plant/crop requirements

Implications for identifying land use/management options

### Topic(s):

Resource Use

* + - Resource concepts
    - Soil degradation
    - Canada land inventory
    - Land use

## Lab

### Topic(s):

Organizational lab to develop groups for the major project

### Topic(s):

Soil Formation and Classification

### Topic(s):

Soil Physical Properties

### Topic(s):

Water in Soils

### Topic(s):

Chemical and Mineralogical Characteristics of Soils

### Topic(s):

Plant Nutrients

## Laboratory/Project Schedule

Please note that the some of the weeks not used for formal labs will be used to work on the major project as required. Also note that the exact dates of laboratories may change depending on lecture scheduling. Check CourseLink for lab assignments and exact meeting dates.

## Field Trips

The major project requires a site visit to the location of the student chosen project site. This trip will be self led at a mutually agreed date for the group members. Further information on the nature of the trip is given in the project outline handout and will be discussed in class. Any

costs related to the travel the study site is the responsibility of the students in the specific group.

# Assessments

## Marking Schemes & Distributions

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| --- | --- |
| Name | Scheme A (%) |
| Midterm Exam | 20 |
| Major Project | 40 |
| Final Exam | 40 |
| Total | 100 |

* 1. **Assessment Details**

### Midterm Exam (20%)

**Due:** Wed, Oct 25, In class

**Major Project (40%) Date:** Thu, Nov 22

### Final Exam (40%)

**Date:** Fri, Dec 14, 2:30 AM - 4:30 AM

# Course Statements

## Grading Policies:

Policy on Late Assignments:

Major reports received late will be penalized 5% per day without an adequate explanation given before the due date. Anything received after the last class day without adequate reason(s) for being late before the due date will receive a grade of zero.

## Course Policy on Group Work:

The major report will be completed by groups of 3 to 4 students and a single report will be provided for each group.

## Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

# University Statements

## Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e- mail is the official route of communication between the University and its students.

## When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for [Academic Consideration](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml) are detailed in the Undergraduate Calendar.

## Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two- semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml) are available in the Undergraduate Calendar.

## Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

## Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: [www.uoguelph.ca/sas](http://www.uoguelph.ca/sas)

## Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it.

Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml) is detailed in the Undergraduate Calendar.

## Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## Resources

The [Academic Calendars](https://www.uoguelph.ca/registrar/calendars/) are the source of information about the University of Guelph’s procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.