UNIVERSITY OF SASKATCHEWAN
Distance Education Unit
DISTANCEEDUCATION.USASK.CA

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Please Note: This *Class Syllabus* is an important step in updating the format of our distance classes. If for any reason the *Class Syllabus* does not match the online class information, the *Class Syllabus* shall be taken as correct.

# CLASS SYLLABUS (NON CREDIT)

**COURSE TITLE:** Introduction to Field Description of Soils

**COURSE CODE:** SLSC 205

**COURSE CREDITS:** 1

**COURSE SECTION:** W01-W99

**TERM:**

**DELIVERY:** Online

**START DATE:**

**END DATE:**

## Course Description

The official course description and prerequisites are in the U of S Course and Program Catalogue available at http://www.usask.ca/calendar/coursecat/

## Course Learning Outcomes

Upon completion of this course, students will be able to;

1. Explain how the main attributes assessed in a site description affect the suitability of the soil for different purposes.
2. Identify diagnostic features of soil horizons including soil texture, structure, colour and soluble salts.
3. Explain the Munsell system for soil colour and the conditions that lead to distinct combinations of colour in soils.
4. Complete a hand texturing of soils and relate different textural classes to major parent materials in western Canada.
5. Distinguish major classes of soil structural units (“peds”) and explain the implication of different structures on water and root movement in soils.
6. Recognize properties of soils that limit plant growth such as highly soluble salts and acidic pH.
7. Utilize field descriptions of soil properties to determine the correct soil horizon labels according to the Canadian System of Soil Classification.

## Course Overview

This course focuses on developing the necessary skills related to the field description of soils. Students will learn how to completely describe soils in the field based on their properties. Students will then be able to use these soil properties in relation to other local factors to influence management decisions. The course also requires students to use information from existing soil profile descriptions to develop management recommendations for various environmental and agricultural management problems.

Each module in the course focuses on one aspect of the soil profile description. The main properties covered are soil colour, soil texture, soil structure and consistence, soluble salts and carbonates, and organic horizons. In each module, the property itself is defined and the method used in the Canadian System of Soil Classification to describe it is covered. Then the relevance of the property for soil management is explained. Finally, one or more assignments in each module require the student to take the information from existing soil profiles and apply it to provide data for a management decision. The assignments are an integral part of the course.

The course does not cover the assignment of horizon labels to each horizon or the genesis of the soil properties. The development of an accurate profile description is, however, the essential foundation for horizon labeling and soil classification.

## Your Instructor

Instructor/Coordinator/Facilitator: **Kobby Fred Awuah**

### Contact Information

**Phone:** 306-966-4228

**Email:** fred.awuah@usask.ca

The best way to contact me is by email. I will usually respond within 24 hours. If I plan on being away, I will send an email to the whole class and post a message in the announcements section on BBL.

### Office Hours

**By appointment**: 9 am-5 pm
Department of Soil Science, Rm 5C04 Agriculture Building

### Profile

Kobby Fred Awuah was born in Ghana where he acquired his BSc. in Natural Resource Management (Forestry) and worked with the Forestry Commission of Ghana for a year. He proceeded to Minnesota for his MSc. in Environmental Science, worked in North Dakota as an Environmental Quality Inspector (Health and Safety) and then to the U of S for his PhD in Soil Science/Toxicology (IP). Kobby's primary areas of focus are metal mixtures, soil microbes and ecosystem services. He's currently working on estimating the toxicity of metal mixtures to soil microorganisms and the potential for functional recovery. He's also looking at the influence of metal speciation in predicting metal mixture toxicity. He has assisted Professors in course facilitations both at the University of Saskatchewan and during his MSc in the United States of America. He instructed Renewable Resource Management (RRM) 215 in 2016 and will instruct it again in 2018.

Ideally, "as learners walk into my class as parent materials, I aim to see them exit as developed soils that are on one hand unique, but have in common the ability to function as all soils do; the ability to support life such as microbes and vegetation". **Kobby F. Awuah**

## Outside of Class Time

Students will be expected to use time outside of the 13 lecture hours (class time) for reading and understanding the required readings and notes. Students are expected to spend up to 2 hours per lecture hour or an additional 26 hours reviewing this material and completing assignments. Preparation for the quizzes is also expected to be done within this time, outside of class.

## Required Resources

### Textbook

There is no textbook required for this course.

### Electronic Resources

Videos are used in all modules for the course.

### Mobile Access

Blackboard Mobile Learn™ is an app that is available on many devices including iOS® and Android™ for those occasional times when you may want mobile access. It is still recommended that you use a laptop or desktop computer for the majority of your online studies.

## Class Schedule

| Week of | Module | Readings | Evaluation Due Date |
|---|---|---|---|
| Sept. 6 | 1<br>Soil Profiles and Profile Descriptions | Ayres, K.W., D.F. Acton, and J.G. Ellis. 1985. The Soils of the Swift Current Map Area 72J Saskatchewan. Saskatchewan Institute of Pedology Publication S6. Extension Publication 481, Extension Division, University of Saskatchewan. http://sis.agr.gc.ca/cansis/publications/surveys/sk/sks6/sks6_report.pdf<br>Pennock, D.J. Reference Handout for Soil Science Courses. Department of Soil Science, University of Saskatchewan. **[PDF in Blackboard].** | Assignment 1 (Sept. 12th by 4:30 pm) |
| Sept. 14 | 2<br>Description and Interpretation of Soil Colour | Watson, K. and D. Pennock. (2016) Field Handbook for the Soils of Western Canada. Section 3. Horizon Description. Canadian Society of Soil Science. http://www.soilsofcanada.ca/documents/Soil%20Profile%20Description.pdf#Soil Profile Description<br>Pennock, D.J. Reference Handout for Soil Science Courses. Department of soil Science, University of Saskatchewan. **[PDF in Blackboard].**<br>Soil Profile Compendium. **[PDF in Blackboard].** | Assignment 2 (Sept. 19th by 4:30 pm) |

| Week of | Module | Readings | Evaluation Due Date |
|---|---|---|---|
| Sept. 21 | 3<br>Soil Texture | Watson, K. and D. Pennock. 2016. Field Handbook for the Soils of Western Canada. Section 3. Horizon Description. Canadian Society of Soil Science. http://www.soilsofcanada.ca/documents/Soil%20Profile%20Description.pdf#Soil Profile Description<br>Pennock, D.J. Reference Handout for Soil Science Courses. Department of Soil Science, University of Saskatchewan. **[PDF in Blackboard].** | Assignment 3 (Sept. 26th by 4:30 pm) |
| Sept.28 | 4<br>Soil Structure and Consistence | Watson, K. and D. Pennock (2016) Field Handbook for the Soils of Western Canada. Section 3. Horizon Description. Canadian Society of Soil Science. http://www.soilsofcanada.ca/documents/Soil%20Profile%20Description.pdf#Soil Profile Description<br>Pennock, D.J. Reference Handout for Soil Science Courses. Department of soil Science, University of Saskatchewan. **[PDF in Blackboard]**<br>Health Protection Branch. 2014. Sewerage System Standard Practice Manual. Version 3. B.C. Ministry of Health. http://www2.gov.bc.ca/assets/gov/environment/waste-management/sewage/spmv3-24september2014.pdf | Assignment 4 (Oct. 3rd by 4:30 pm) |
| Oct. 5 | 5<br>Field Sampling Methods | Watson, K. and D. Pennock. (2016) Field Handbook for the Soils of Western Canada. Section 3. Horizon Description. Canadian Society of Soil Science. http://www.soilsofcanada.ca/documents/Soil%20Profile%20Description.pdf#Soil Profile Description<br>Pennock, D.J. Reference Handout for Soil Science Courses. Department of soil Science, University of Saskatchewan. **[PDF in Blackboard].** | Assignment 5 (Oct.17th by 4:30 pm) |

*Note: If for any reason the Class Syllabus Reading List does not match the Module Reading List, the Class Syllabus shall be taken as correct.*

## Evaluation Components

**As a non-credit student you are encouraged to complete assignments, however you will not be able to write the final exam, nor will you be graded or receive a final mark in the class.**

### Assignment 1

**Due Date**: See Class Schedule

**Type**: This assignment introduces students to organic carbon storage and provides practice in converting between units.

**Description**: Working with different units is an essential numeracy skill associated with soil sampling. In this assignments students convert basic units for soil organic carbon storage into more useful soil carbon density measurements. They compare their results to published values for different soil zones in Saskatchewan.

### Assignment 2

**Due Date**: See Class Schedule

**Type**: This assignment involves further recalculations and practice with conversion between units.

**Description**: The objective of Assignment 2 is to further develop skills in converting between units and in converting values to more user-friendly forms. In this exercise the student works with plant-available nitrogen and uses it to illustrate the concept of temporal variability.

### Assignment 3

**Due Date**: See Class Schedule

**Type**: This assignment involves the calculation of standard descriptive statistics for soil properties.

**Description:** The statistical summary of soil variability is an essential part of the design of any sampling program.

### Assignment 4

**Due Date**: See Class Schedule

**Type**: This assignment integrates methods learned in the previous assignment to design a sampling program in accordance with a regulatory framework for assessment of well site disturbance.

**Description:** The design of sampling programs is often determined in part by the regulatory framework for specific activities. In this assignment students will use the regulations for assessing well site disturbance in Alberta to design and critique a sampling plan.

### Assignment 5

**Due Date**: See Class Schedule

**Type:** This assignment examines the effect of salinity and sodicity on water-holding capacity.

**Description:** The presence of highly soluble slats prevents plant roots of most agricultural crops from taking up soil water requiring a different set of water-holding calculations for the soil profile.

## Submitting Assignments

Submit assignments electronically to your instructor using the Blackboard Assignment tool. You should keep a personal copy of all assignments submitted.

## Students with Disabilities

If you have a diagnosed disability (learning, medical, physical, or mental health), you are strongly encouraged to register with Disability Services for Students (DSS). In order to access DSS programs and supports, you must follow DSS policy and procedures. If you suspect you may have a disability, contact DSS for advice and referrals. For more information, see http://www.students.usask.ca/disability/ or contact DSS at 306-966-7273 or dss@usask.ca.

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.

## Integrity Defined (from the Office of the University Secretary)

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (http://www.usask.ca/secretariat/student-conduct-appeals/StudentAcademicMisconduct.pdf) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (http://www.usask.ca/secretariat/student-conduct-appeals/StudentNon-AcademicMisconduct.pdf)

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at:
http://www.usask.ca/secretariat/index.php

## Copyright

Every effort has been made to trace ownership of all copyrighted material and to secure permission from copyright holders. In the event of any question arising as to the use of any material, we will be pleased to make the necessary corrections. The University of Saskatchewan copyright policy is available at http://www.usask.ca/copyright/

## Module Objectives

### Module 1: Soil Profiles and Profile Descriptions

1. Define soil horizon, soil profile, and soil pedon.
2. Identify the main properties that associated with horizons and the soil-forming processes responsible for them.
3. Associate the main soil properties with specific management-relevant information.
4. Identify the components of a profile description.

### Module 2: Description and Interpretation of Soil Colour

1. Explain the components of the Munsell Soil Colour Charts.
2. Interpret the colours of A horizons in terms of soil organic matter content and acidity.
3. Explain the process of gleying in soils and its implication for management.
4. Apply the criteria for gleying in soils to correctly label horizons.

### Module 3: Soil Texture

1. Define particle size and the four particle size classes.
2. Apply the textural triangle to determine texture classes.
3. Identify the main management issues associated with different textural classes.
4. Associate specific textural classes to the main types of parent materials.
5. Calculate the available water-holding capacity of a soil profile.

### Module 4: Soil Structure and Consistence

1. Identify the major types of soil structure and associate the grades of structure with different textural ranges.
2. Associate the types of structure with patterns of root and water movement in the soil.
3. Understand how consistence tests are performed in the field.
4. Apply information about texture, structure, and related soil properties to interpretations for placement of septic tanks.
5. Understand how the formation of soil structures are influenced by certain soil properties and factors and how this information can be used in making relevant management decisions.

### Module 5: Carbonates, Salinity, and Organic Horizons

1. Identify carbonates in a soil profile description and assess if they are primary or secondary carbonates.
2. Identify salts in a soil profile description and determine the subsequent steps required to assess the level of salts present in the soil.
3. Distinguish between soil salinity and sodicity.
4. Distinguish between forest leaf litter and organic horizons in the soil and explain the Von Post Decomposition Scale.
5. Calculate the effect of salinity in the profile on the water-holding capacity of the profile and assess the relationship between texture, structure, and salinity/sodicity.

# Acknowledgements


## Course Author

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## Instructional Design and Class Development

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