

The University of Manitoba  
Faculty of Agricultural and Food Sciences  
Department of Soil Science



**COURSE TITLE** Soil Productivity and Land Use

<b>Department:</b>	Soil Science	<b>Course Number:</b>	SOIL 0420
<b>Academic Session:</b>	Fall 2022	<b>Credit Hours:</b>	4
<b>Department Office Location:</b>	362 Ellis	<b>Department Phone Number:</b>	(204) 474-8153

<b>Classroom Location:</b>	Room 245 Ellis	<b>Class Time:</b>	Tuesday/Thursday	10:00-11:15 a.m.
<b>Lab Location:</b>	Room 318 Ellis	<b>Lab Sections:</b>	Tuesday/Thursday	11:30-12:45 a.m.
<b>Course Web Page:</b>	UM Learn		Thursday	1:00-2:15 p.m.
		<b>Field Tour:</b>	Thursday October 13, departure time 10am	

**Course Instructor:** Marla Riekman  
Email: marla.riekman@umanitoba.ca  
Cell: 204-918-8440  
Office Hours: by appointment

**Teaching Assistants:** Viranga/Rida (Tues 11:30-12:45 a.m.)      Viranga (Thurs 11:30-12:45 a.m.)  
Rida (Thurs 1:00-2:15 a.m.)

#### **Class Communication**

Students are expected to establish and regularly access their official University email account, which is the email address that will be used for communication about this course. For full details of the Electronic Communication with Students please visit: [http://umanitoba.ca/registrar/email\\_policy/](http://umanitoba.ca/registrar/email_policy/).

#### **Cell Phones, Tablets and Laptops**

To maintain a classroom environment that is conducive to learning and be respectful to your classmates and instructor, turn your cell phone off for the lecture period. If you are expecting an emergency call, please notify the instructor at the beginning of the lecture. If you are using a tablet or laptop computer to take notes, please stay on task (i.e. do not check emails or browse the internet).

#### **Recording of Lectures**

Students are not permitted to record lectures without the permission of the instructor.

#### **Students' Learning Responsibilities**

The lecture slides will be provided to students in digital format on the UM Learn course page prior to start of each new section in the class. Each student is expected to have these slides for reference during class and to supplement them with their own notes from the lectures. The slides are made available to facilitate learning the course material and to provide an opportunity for interactive class sessions. Class attendance is needed if students are to gain a full understanding of the course material. Students who attempt to pass this course without attending class do so at their own risk.

#### **How this course fits into the curriculum**

SOIL 0420 is a required course in the Agriculture Diploma program. The material is designed to provide a basic understanding of soil properties, why soil is a productive medium, why soils differ from place to place and the different capabilities of soil as a natural resource.

#### **Calendar Description**

Soil formation; soil physical, chemical and biological properties; soil classification systems, maps and reports; soil fertility, crop nutrients, soil sampling and testing; agricultural productivity. A full-day field trip is required.

## Course Objectives

At the completion of this course, the student should be able to:

1. Describe basic physical, chemical and biological properties of soil;
2. Interpret soil survey and capability maps and reports; and
3. Describe soil nutrients and their cycles in the context of agricultural crop requirements.

## Description of Examinations

There will be two midterms and a final exam.

October 18	Midterm 1 will cover the lectures from September 13 to October 6.
November 17	Midterm 2 will cover the lectures from October 20 to November 15.
Final Exam	The final will be divided into two segments: the first section will cover all the lectures after Midterm 2, the second section will consist of long answer questions that cover information from the entire course. A list of potential long answer questions will be provided ahead of the exam.

## Missed Exams

Students who know beforehand that they will not be able to attend an exam must contact the instructor to make alternate arrangements. Students who miss an exam without notice will receive a grade of zero on the exam.

## Laboratory Assignments

Laboratory assignments are designed to be completed during the laboratory session and handed in at the end. They will be graded and returned the following week. The concepts will be covered previously in the lectures and students should bring their lecture notes to the lab to refer to the material when needed. During some of the lab periods, students will perform calculations and should bring a calculator. If a laptop is required to complete a lab assignment, the instructor will notify the class in advance.

**Laboratory Schedule:** Assignments for each laboratory are due at the end of lab.

September 20, 22	Lab 01	Soil Colour and Texture
October 4, 6	Lab 02	Soil Classification and Identification
October 18, 20	Lab 03	Soil Survey Reports
October 25, 27	Lab 04	Determining Field Capacity
November 1, 3	Lab 05	Soil pH, Electrical Conductivity and Carbonates
November 22, 24	Lab 06	Fertilizer Recommendations
November 29, Dec 1	Lab 07	Fertilizer Rates and Costs
December 6, 8	Lab 08	Manure Management

## Late or Missed Assignments

Laboratory and field trip attendance is required. Lab assignments must be submitted at the end of the laboratory period in order to accommodate timely feedback of grades and comments. If students know beforehand that they will not be able to attend a laboratory session, they should contact the instructor to make alternate arrangements. Students who do not submit assignments on time will receive a grade of zero on that exercise, unless they have been granted an extension.

## Grade Evaluation

Midterm Exams.....	30%
Laboratory Assignments.....	30%
Field Trip Assignment.....	5%
Final Exam.....	35%

## Texts, Readings, Materials

No textbook is required. The Powerpoint slides for download from the course UM Learn page (color) constitute the study material for the class.

## Other resources for supplemental learning:

N.C. Brady and R.R. Weil, 1998. The Nature and Property of Soils (Twelfth Edition).

Havlin, J.L., J.D. Beaton, S.L. Tisdale, and W.L. Nelson, 1999. Soil fertility and Fertilizers: An Introduction to Nutrient Management (Sixth Edition).

Henry, L, 2003. Henry's Handbook of Soil and Water.

Manitoba Agriculture, Food and Rural Initiatives, 2007. Soil Fertility Guide. Online:  
[https://www.gov.mb.ca/agriculture/crops/soil-fertility/soil-fertility-guide/pubs/soil\\_fertility\\_guide.pdf](https://www.gov.mb.ca/agriculture/crops/soil-fertility/soil-fertility-guide/pubs/soil_fertility_guide.pdf)

Manitoba Agriculture, Food and Rural Initiatives, 2008. Soil Management Guide. Online:  
<https://www.gov.mb.ca/agriculture/environment/soil-management/soil-management-guide/pubs/soil-management-guide.pdf>

**Your rights and responsibilities**

For student resources, including student accessibility services, writing and learning support, library information, academic advisory services, student advocacy, and policies regarding student discipline, intellectual property and reporting sexual assaults, please see Schedule A posted on this course's UM Learn website.

**Course Content**

<u>Topic</u>		<u>Number of Lectures</u>
1.	Introduction	
1.1	What is soil?	3
1.2	What is horizon, profile and soil pedon?	
1.3	Soil physical properties - texture, structure, bulk density, porosity	
2.	Classification of Soils	
2.1	Soil forming factors, origin of prairie landscapes	2
2.2	The purpose of soil classification	
2.3	The Canadian Classification System	
3.	Soil Survey and Agriculture Capability	
3.1	Legal survey system	2
3.2	Soil survey and reports	
3.3	Agriculture capability mapping and reports	
3.4	MASC soil productivity index, ag productivity, target yields	
4.	Soil Water	
4.1	Forms of water in the soil system	2
4.2	Soil water measurement (field capacity, permanent wilting point)	
4.3	Water movement, management, use and losses	
5.	Soil Chemistry	
5.1	pH, anion-cation exchange	2
5.2	Salinity and sodicity	
6.	Soil Organic Matter	
6.1	Nature, composition and decomposition (C and N cycling)	2
6.2	Importance in soils, beneficial and detrimental effects	
6.3	Effect of management practices on organic matter	
7.	Soil Fertility and Fertilizers	
7.1	Soil as a store of plant nutrients, nutrient availability	5
7.2	Macronutrients and micronutrients	
7.3	Nutrient deficiencies and toxicities, nutrient cycling/balance	
7.4	Nutrient sources - commercial fertilizers and manure	
7.5	Soil sampling and soil testing	