SOIL 4520 Soil Fertility Course Syllabus
September - December 2020

Instructor: Dr. Don Flaten, Dept. of Soil Science, 307 Ellis Building
Phone : (204) 474-6257 E-mail: Don.Flaten@UManitoba.CA

Calendar Description for this Course - forms and behaviour of plants nutrients in soil; soil fertility evaluation and management, including fertilizer sources and practices. Prerequisite: SOIL 3600.

Course Objectives - After completing this course, students will:
- understand the principles and practices of nutrient management for crop production
- understand the implications of soil fertility management practices on agricultural sustainability and environmental protection
- be able to apply their individual and collective knowledge to solving real world nutrient management and soil fertility problems
- be able to communicate their recommendations for nutrient management and soil fertility to others

Class Timetable and Location - Lectures and labs will be offered online and synchronously, via Webex within UM Learn. In other words, students are expected to participate in online lectures on Mondays, Wednesdays, and Fridays 9:30-10:20 and labs on Thursdays 2:30-5:20. This format will facilitate a sustainable pace for learning, plus "live" discussion of students' questions and assisted group work during the lab periods.

Notices and Course Materials Posted on UM Learn – Students are also expected to regularly access the notices and class material posted on the UM Learn website for this course. Summary lecture notes and reference material for the laboratory assignments and term project will be posted on UM Learn. In addition, recordings for online lectures will be available via Webex on UM Learn for streaming for a minimum of one week and a maximum of two weeks after the lecture is given. For more information about accessing UM Learn, go to: https://centre.cc.umanitoba.ca/technology/umlearn/

Summary Notes - The course notes posted on UM Learn are "skeleton" notes that provide only an outline of basic information covered in lectures. Students are expected to participate in all lectures, when this material will be discussed and expanded upon and when students can ask questions. Students are also encouraged to supplement and personalize their class notes for active and effective learning and studying.

Recommended Text:
Soil Fertility and Fertilizers: An Introduction to Nutrient Management. 8th Edition (the 7th or 6th editions are also good reference books). 2014. J.L. Havlin, S.L. Tisdale, W.L. Nelson, and J.D. Beaton. Available from U of M Bookstore.

Other References:
Soil Chemistry (4th, 3rd or 2nd Edition). D.G. Strawn and/or H.L. Bohn
Soil and Water Chemistry: An Integrative Approach. (2nd or 1st Edition). M. Essington

Availability of Instructor:
Students with questions or suggestions are strongly encouraged to ask questions during or immediately after the regular lecture periods (MWF 9:30-10:30) and lab periods (Thurs 2:30-5:30). There will also be optional tutorial sessions prior to exams. Due to other other time commitments that are unpredictable, please call or send the instructor an e-mail to set up mutually suitable appointment.

Class Communication via Email

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.

Expectations for Student Participation in Online Lectures, Labs, and Exams

Students are expected to utilize reliable internet with sufficient capacity to handle online lectures, labs, and exams. Please note that in cases where internet access fails, students will have access to a toll-free dial-in number to support audio-only calls with Webex for teaching and learning. This option will appear automatically when students login to a Webex session.

To participate in lectures and labs via Webex, please follow the following instructions:

- Open Chrome browser (Google Chrome is the preferred browser for use with Webex)
- Log into UM Learn
- Locate this course in UM Learn and click into the UM Learn home page for the course
- Click on the "Communication" tab at the top; click on "Cisco Webex" to see the "Event Calendar"
- In Webex, click on the appropriate date and time to "Join" the lecture or lab session
- Mute yourself to avoid background noise and stop your video to reduce bandwith requirements
- To ask questions, first type your request in the chat box to notify the instructor; then, when you are acknowledged by the instructor, unmute your microphone to ask your question
- If you run into problems on UM Learn, please send an email to the instructor as listed above

For more information about using Webex in UM Learn, go to:
https://centre.cc.umanitoba.ca/wp-content/uploads/2020/03/Webex-Students-Instructions-and-FAQ.pdf

Evaluation and Marking Scheme:

- Evaluative feedback will be given to students prior to the voluntary withdrawal deadline.
- Term tests (open book) will be written during the first hour of a regular, 3 hour lab period.
- The final exam, including the lab exam, will be two-hours in length and in open book format.
- Failure to write a midterm or final exam at the scheduled time will result in a grade of zero, except in properly documented cases of medical emergency.
- Detailed instructions for each exam and assignment will be provided.
- Grammar, spelling and composition will be evaluated and considered as part of the grading criteria for tests and assignments.
- Attendance, participation and completion of weekly assignments in the laboratory is compulsory. All lab assignments must be completed satisfactorily by **December 11, 2020** to receive a passing and complete grade.
- General grading scheme (subject to modification by instructor): 90-100 A+, 80-90 A, 75-80 B+, 70-75 B, 65-70 C+, 60-65 C, 50-60 D, <50 F. Comments and grades will be provided on exams and assignments.

Weighting of components:

First midterm exam **(Thursday, Oct. 15)**	15%
Second midterm exam **(Thursday, Nov. 26)**	15%
Final exam, including lab exam (TBA)	40%
Laboratory (Thurs 2:30-5:30, online)	
- weekly problems	15%
- written report on term project	15%

Academic Integrity

Academic integrity helps all of us, improving the quality and long term value of learning, as well as maintaining a good reputation and public confidence in individual students and graduates, as well as students, staff, our Faculty, our university, and our profession.

The University of Manitoba regards acts of academic misconduct in quizzes, tests, examinations, laboratory reports or assignments as serious offences and may assess a variety of penalties depending on the nature of the offence. Penalties range from a grade of zero for the assignment or examination, failure in the course, to expulsion from the University. Examples of misconduct include, but are not limited to:

a) Plagiarism – the presentation or use of information, ideas, sentences, findings, etc. as one's own without appropriate attribution in an assignment, test or final examination.
b) Cheating on quizzes, tests or final examinations – the circumventing of fair testing procedures or contravention of exam regulations. Such acts may be premeditated/planned or may be unintentional or opportunistic.
c) Inappropriate collaboration – when a student and any other person work together on assignments, projects, tests, labs or other work unless authorized by the course instructor.
d) Duplicate submission – cheating where a student submits a paper/assignment/test in full or in part, for more than one course without the permission of the course instructor.
e) Personation – writing an assignment, lab, test, or examination for another student, or the unauthorized use of another person's signature or identification in order to impersonate someone else. Personation includes both the personator and the person initiating the personation.
f) Academic fraud – falsification of data or official documents as well as the falsification of medical or compassionate circumstances/documentation to gain accommodations to complete assignments, tests or examinations

If you have any questions about how to make sure that you're complying with the University's expectations for academic integrity in this course, please contact the instructor for this course.

For more information about the U of M's commitment to academic integrity, go to:
http://umanitoba.ca/student-supports/academic-supports/academic-integrity

For more information about the U of M's Student Discipline By-Law, go to:
http://crscalprod.ad.umanitoba.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=440&chapterid=5113&topicgroupid=27390&loaduseredits=False

Other Student Resources

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 - Policies and Resources for Students** posted on this course's UM Learn website.

SOIL 4520 Soil Fertility Course Outline

(Draft - August 27, 2020)

Approx. # lectures	
	I. Introduction and Review (SFF[1] Ch 1,2)
1	A. Role of soil fertility for crop production
1	B. Overview of nutrient use, uptake and movement
	II. Properties of Soil Solids, Surfaces and Solutions (SFF Ch 2)
3	A. Mineral composition of soil (SC[2] Ch 6 & 7)
	1) Primary minerals
	2) Secondary minerals
	3) Other minerals
	4) Effects of soil minerals on soil fertility
1	B. Organic matter in soil (SC Ch 8)
	C. Surface and solution chemistry
2	1) Soil solids, solubility and precipitation (SC Ch 4)
	a) Free ions, solubility products
	b) Soluble complexes, stability constants
3	2) Soil surfaces & adsorption (SC Ch 9 &10)
	a) Inner sphere adsorption of cations
	b) Inner sphere adsorption of anions
	c) Exchangeable adsorption of ions, outer sphere complexes & diffuse ion swarms
1	3) Effects of pH, acidity and alkalinity (SC Ch 12, SFF Ch 3)
1	4) Effects of pe, redox, and flooding (SC Ch 5)
	III. Soil Fertility and Fertilizers
	Nutrient by nutrient discussion of forms and behaviour of nutrients in soil; nutrient uptake, utilization and deficiency symptoms; fertilizer sources, properties and reactions; and fertilization practices for:
6	A. N (SFF Ch 4)
2	B. S (SFF Ch 7)
4	C. P (SFF Ch 5)
2	D. K (SFF Ch 6)
2	E-I. Ca, Mg, Mo, B, Cl (SFF Ch 7,8)
2	J-M. Cu, Zn, Mn, Fe (SFF Ch 8)
	IV. Soil Fertility Management - General Issues
1	A. Manure management
1	B. Fertility evaluation, fertilizer recommendations (SFF Ch. 9,11)
1	C. Soil fertility and agricultural sustainability (SFF Ch. 10,12)
1	D. Soil fertility and environmental issues (SFF Ch. 10,12)

---

[1] Soil Fertility and Fertilizers, 8th Edition (SFF 7th & 6th editions have slightly different chapter numbers)

[2] Soil Chemistry (4th edition, Strawn et al. 2015)