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

Summary Notes - This set of “skeleton” notes is only an outline of basic information covered in lectures. Students are expected to participate in all lectures, where this material will be discussed and expanded upon. Students are also encouraged to supplement and personalize their class notes for effective studying.

Course Materials Posted on UM Learn – Summary lecture notes, exams from previous years, and reference material for the laboratory assignments and term project will be posted on UM Learn. For more information about accessing UM Learn, go to:
http://intranet.umanitoba.ca/academic_support/catl/resources/359.html

Recommended Text:
Soil Fertility and Fertilizers: An Introduction to Nutrient Management. 8th Edition (the 7th or 6th editions are also good). 2014. J.L. Havlin, S.L. Tisdale, W.L. Nelson, and J.D. Beaton. Available from U of M Bookstore (copies of the 7th and 6th editions are on 2 hour reserve in the W.R. Newman Library (WRN))

Other References:
Soil Fertility and Fertilizers (7th, 6th, or 5th editions), Soil Chemistry (4th, 3rd or 2nd Edition). D.G. Strawn and/or H.L. Bohn (2 hr reserve in WRN), Soil and Water Chemistry: An Integrative Approach. 2004. M. Essington

Availability of Instructor:
Students with questions or suggestions are welcome to “drop in” to the office (Room 307 Ellis Bldg.) at their convenience. However, I frequently have other time commitments that are unpredictable. Therefore, please call or send me an e-mail to set up an appointment.

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/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf
Cell Phones, Tablets and Laptops
Please help 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 (ie. don’t check emails or surf the internet).

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

Evaluation and Marking Scheme:
- Evaluative feedback will be given to students prior to the voluntary withdrawal deadline.
- Term tests will be written during regular, 50 minute lecture periods.
- The final exam will be two-hours in length.
- 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 9, 2016 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.
- Academic dishonesty will be treated very seriously (see the U of M General Calendar for policies on plagiarism, cheating, and impersonations at exams).

Weighting of components:

First midterm exam (Wednesday, Oct. 19) 15%
Second midterm exam (Wednesday, Nov. 23) 15%
Final exam (TBA) 30%
Laboratory (Thurs 2:30-5:30, 245 Ellis Bldg.)
- problems 10%
- oral report on term project 5%
- written report on term project 10%
- lab exam 15%
SOIL 4520 Soil Fertility Course Outline
(Draft - September 2016)

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 5,7)
  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 6)
C. Surface and solution chemistry
  2 1) Soil solids, solubility and precipitation (SC Ch 3)
    a) Free ions, solubility products
    b) Soluble complexes, stability constants
  2 2) Soil surfaces & adsorption (SC Ch 5,8,9)
    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 10, SFF Ch 3)
1 4) Effects of pe, redox, and flooding (SC Ch 4)

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. Fertility evaluation, fertilizer recommendations (SFF Ch. 9, 11)
1 B. Soil fertility and agricultural sustainability (SFF Ch. 10,12)
2 C. Soil fertility and environmental issues (SFF Ch. 10,12)

\(^1\) Soil Fertility and Fertilizers, 8th Edition … the 7th and 6th editions SFF have slight differences in chapter numbers
\(^2\) Soil Chemistry