

SOIL 7140 Soil Nitrogen
January - April 2015, Tuesdays and Thursdays 8:30-9:45 am, Room 344 Ellis
DRAFT #1 – December 21, 2014

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Course Objectives

The technical content for the course will be aimed at the graduate level, assuming that students are already well-grounded in nitrogen fertility at the undergraduate level. After completing this course, students will have an advanced level of knowledge in a representative number of topic areas in nitrogen fertility (see topic schedule on separate document). The main focus of the course will be on the behaviour of nitrogen in soil; that knowledge will be applied to the determination of nitrogen requirements and management for crop production, agricultural sustainability and environmental protection. In addition to acquiring technical knowledge, students will also further develop their critical thinking skills (e.g., by evaluating and discussing assigned readings from book chapters and scientific journals) and their communication skills (e.g., by writing several short summary papers and at least one major review paper and by orally presenting their review paper for discussion).

Format for the Course

Students will learn through reading, writing, presenting and discussing the course material. Given the substantial emphasis on literature readings and discussion, all students are expected to prepare themselves well for each topic and to contribute informed opinion to each discussion session. The class will meet twice per week for a total of 24-26 sessions. Each session will be approximately 1.5 hours in length and most will be paired by topic. The content of each pair of sessions will consist of:

Session 1) General Review of Literature (usually Tuesdays)

- Brief introduction from the discussion topic facilitator (5-10 minutes), usually Dr. Flaten
- Oral presentation of a review paper by a student presenter or scientist (30 minutes)
 - copies of the review papers will be duplicated and circulated to course participants at least one week prior to the class during which the material will be discussed (see detailed instructions that follow)
 - student presentations will be evaluated for technical content and presentation technique (see marking scheme attached)
 - if a student presentation is not assigned to the topic, a general review paper from the literature will be assigned and discussed in detail
- Discussion regarding the presentation and/or case studies or problems (30-60 minutes)
 - in order to encourage adequate preparation for an informed discussion, all students (including the student presenter) will complete a short exercise on the topic and submit that exercise at the end of that topic session (see detailed instructions that follow).

Session 2) Discussion of Assigned Scientific Research Papers (usually Thursdays)

- Discussion of assigned readings of papers (75 minutes)
 - required readings in refereed journals and other sources will be assigned for each topic
 - all students are required to read the assigned papers carefully, complete the assigned reading exercises and prepare for a series of oral questions on the assigned readings (see detailed instructions that follow)
- Introduction of next week's topic, readings and expectations (5 minutes)

Evaluation and Marking Scheme:

Attendance and participation in the discussion periods is compulsory. Students will be graded according to the following:

Weekly assignments	25%
First version of review paper	30%
Oral presentation of review paper	15%
Revised version of review paper	15%
Participation in discussion	15%
Late penalties	25% for each 24 hour period

Guidelines for Student Presentations

Written Review Papers

- students must meet with Dr. Flaten at least three weeks prior to their presentation to discuss their proposed outlines and references
- focus on 20-30 key papers that illustrate contemporary knowledge in the topic
- papers should be 15 to 20 pages in length, excluding figures, tables and references (10% will be deducted for every page over 20 pages), using an 11 point font and allowing a 1.5 line spacing to allow readers to add comments
- provide an introduction, body and summary or conclusion for the paper, plus a complete list of references. Most of the body for the paper should emphasize the fundamental processes in that topic area; however, the practical implications for agronomic production and environmental protection should also be addressed briefly.
- each student will be required to submit two versions of their review paper: the first version is presented to the class; the second is a revised version, based on feedback received from professors and students.
- the first version of the review paper must be duplicated and distributed to all class participants the week prior to the oral presentation

Oral Presentation of Review

- use standard practices for good oral presentations, with an obvious introduction, body and conclusion, as indicated on the evaluation sheet attached

Guidelines for Assigned Reading Exercises

All students shall complete the following assignments. Assignments should be typed, single spaced, and fit onto a single sheet. Hard copies of assignments are due at the end of each discussion period.

For review papers (student presenter's or assigned written review paper):

Compose three questions that could be asked to initiate discussion in the session. Ask "open-ended" or "thinking-type" questions that focus on analysis, creativity, adaptation, or evaluation and which are not easily answered by a simple yes, no, or memorized fact. Provide two or three sentences to explain why you think those questions are important. The three questions should focus on the following three perspectives:

- a) Fundamental processes in that topic area, including effects of temporal and spatial variability
- b) Practical implications for agricultural production
- c) Practical implications for environmental protection or sustainability

For research papers:

- a) Identify the most important discovery or contribution to knowledge in each paper (ie. select only one discovery or contribution). Briefly explain and justify (1 paragraph).
- b) Identify the greatest weakness in each paper or the most important next logical step required to expand knowledge in the area. Briefly explain and justify (1 paragraph).

Suggested General References:

Nitrogen in Agricultural Systems (Agronomy Monograph #49). 2008. J.S. Schepers and W.R. Raun, eds. 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.

Important Notice: *Plagiarism or any other form of cheating in academic work is subject to serious academic penalty including suspension or expulsion from the faculty or university. To plagiarize is to take ideas or words of another person and pass them off as one's own. Plagiarism applies to any written work, in traditional or electronic format, as well as orally or verbally presented work. It is not necessary to state the source of well known or easily verifiable facts, but students are expected to appropriately acknowledge the sources of ideas and expressions they use in their written work, whether quoted directly or paraphrased. This applies to images, diagrams, or statistical tables, as well as to written material, and materials or information from Internet sources. To provide adequate and correct documentation is not only an indication of academic honesty but is also a courtesy which enables the reader to consult these sources with ease. Failure to provide appropriate citations constitutes plagiarism. When in doubt about any practice, ask your advisor or professor and refer to the Student Advocacy website.*

**Winter 2015 Topic Preferences for SOIL 7140 Soil Nitrogen
(Draft #6 – Revised – February 2, 2015)**

All sessions are Tuesday and Thursday mornings, from 8:30 until 9:45 in Room 344 Ellis Building.

Topic	Presenter	Dates
Introduction and Review		
Introduction to grad course		Jan 8
N Behaviour & Management Review - part 1		Jan 13
N Behaviour & Management Review - part 2		Jan 15
N Behaviour & Management Review - part 3		Jan 20
N Behaviour & Management Review - part 4		Jan 22
N Behaviour & Management Review - part 5		Jan 27
Overview of Challenges for Managing Soil N		Jan 29
Biological Transformations of N		
- Biological N ₂ Fixation	Gustavo	Feb 3, 5
- Mineralization & Immobilization		Feb 10, 12
- Nitrification & N ₂ O Emissions during nitrification	Megan	Feb 24, 26
- Biological & Chemical Denitrification	Mayowa	Mar 3, 5
- Movement & Leaching of NO ₃	Ahmed	Mar 10, 12
Chemical Transformations and Transport of N		
- NH ₄ ⁺ Adsorption/Fixation	Greg	Mar 17, 19
- NH ₃ Volatilization and Toxicity	Cassandra	Mar 24, 26
Nitrogen Management in Agriculture		
- Measuring Plant Available N in Soils	Amanda	Mar 31, Apr 2
- N Recommendations for Yield, Quality, Economic, and Environmental Objectives	Magda	Apr 7, 9
- Fertilizer Forms, Additives and Application Practices	William	Apr 14, 16