

**SOIL 7250 Special Topics in Soil Science
Seeking Sustainability: A Systems Perspective**

January 30th – April 10th, 2013, Wednesdays 2:30-5:30 pm, Room TBA
DRAFT #3 – January 4, 2013

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Course Objectives

The technical content for the course will be multi-disciplinary in nature and aimed at the graduate level. After completing this course, students will have an improved understanding of the challenges and opportunities for improving the sustainability of agricultural production systems. In addition to acquiring technical knowledge about the issue of agricultural sustainability, students will also further develop their critical thinking skills (e.g., by evaluating and discussing assigned readings from scientific journals and their communication skills (e.g., by writing weekly assignments).

Format for the Course

Students will learn through reading, writing, and discussing the course material (please refer to list of topics on next page). Given the substantial emphasis on readings and informed 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 once per week for a total of 10 sessions. Each session will be approximately 2-3 hours in length.

Except for the last session (where students will present their perspectives on improving sustainability, locally), the content of each weekly session will consist of:

- Brief introduction from the discussion topic leader (15 minutes), Dr. Janzen or an assigned student
- Discussion of assigned readings of chapters, reports or papers (90-150 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)

Weekly Reading Assignments (Sessions 1-9)

Compose four 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. Suggested focus areas include biophysical implications for agricultural production and the environment, economic implications, and social implications. Provide two or three sentences to explain why you think each question is important and how it relates to the assigned readings. The questions should be posed to the following four audiences:

1. The author of the paper (e.g., asking for explanation of apparent oversight or logical lapse; asking for ramifications of a particular observation)
2. Yourself (e.g., what intriguing new research question would you be excited to tackle?)
3. A researcher in another discipline (e.g., what research question needs to be addressed by someone with expertise in an area outside yours).
4. Societal decision-makers (e.g., what is the most important question that needs to be addressed by policy-makers, politicians (local, provincial, national and international), educational leaders, etc.)

Weekly assignments should be typed, single spaced, and fit onto a maximum of 2 pages. Electronic copies of assignments are due to Henry Janzen and Don Flaten prior to each discussion period.

Oral Presentations (Session #10)

During the last session of the course (scheduled for April 10th), each student will give a short oral presentation (15-30 minutes) about how they would apply their knowledge to improving the sustainability of a local farming system. The presentation will include a brief review of the most important constraints and opportunities for managing this system sustainably over the next 50 years. More information about this assignment will be provided at the initial meeting of the class (January 30th).

Evaluation and Marking Scheme:

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

Weekly assignments	60%
Oral presentation (final class period)	20%
Participation in discussion	20%
Late penalties	25% for each 24 hour period

List of Topics for Weekly Sessions

1. What is sustainability?
 - Pondering definitions of sustainability... (How can we say whether a system is sustainable or not if we do not agree on what constitutes "sustainability"?)
2. The global challenges/constraints
 - An overview of the prominent global constraints to sustainable systems: water, biodiversity, energy, nutrients, waste absorption, climate
3. Agriculture at the forefront: food is first
 - Agricultural sciences must lead in search for sustainability, because:
 - Food production occupies much of the world's land base
 - Food always takes precedence
4. Systems perspective
 - Sustainability can only be understood (and sought) by looking at the whole systems; focusing on one facet alone can lead to perverse outcomes.
5. Some examples of a systems perspective
 - The place of biofuels
 - Land-livestock interactions
6. Predicting an uncertain future (models, uncertainty)
 - How can we develop sustainable systems for a rapidly-changing world whose future conditions we cannot predict?
7. Monitoring our systems: what do we measure?
 - If we want to know whether a system is sustainable, what do we measure? And how do we include 'time'?
8. The human perspective: social-ecological systems
 - Looking beyond the physical sciences: including Earth's most dominant species in developing sustainable systems
9. Beyond science: including non-scientists in search for sustainability
 - How do we include those outside agricultural science in the search for sustainability? (Ultimately it will be human behaviour not technology or scientific data that will determine the fate of the planet.)
10. Applying principles of sustainability locally
 - There are no universal 'Best management practices'; the question of sustainability must always be asked (and answered) in local landscapes (with local wisdom).
 - Students will provide short oral presentations (15-30 minutes each) on their recommendations for improving the sustainability of agricultural systems in their local community