

SOCR 475, Global Challenges in Plant and Soil Science

Spring 2012

Time and Place: Class will meet Tuesdays and Thursdays, 2:00-3:15 am in Military Science 105

Credits: 3

Prerequisites: 1 semester of Biology; SOCR 240 or another Earth Science class; Jr. or Sr.-level status; or permission of instructor.

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Consultation hours: By arrangement

Learning Objectives: Students will

1. Improve their awareness and understanding of major global issues in plant and soil science,
2. Improve their ability to critically evaluate scientific topics and develop problem-solving approaches,
3. Enhance their writing skills through different types of writing assignments,
4. Benefit from in-class and online discussions with students and faculty and learn skills in facilitation of discussions, and
5. Increase their expertise in finding and evaluating information on complex global issues.

Approach: We will use case studies as a way of integrating soil and plant science information with socio-economic realities to engage students in international agriculture. The use of case studies in college courses has been shown to increase student engagement with the subject matter and improve higher level learning, including analytical, problem-solving, and communication skills.

Texts: Numerous texts will be used including the following:

- D.J. Spielman and R. Pandya-Lorch (ed). 2009. Millions Fed: Proven successes in agricultural development. International Food Policy Research Institute, Washington, D.C. (<http://www.ifpri.org/publication/millions-fed>)
- R.L. Tinsley. 2004. Developing smallholder agriculture: a global perspective. AgBe Publishing, Brussels, Belgium.
- Successes in African Agriculture, Lessons for the Future. International Food Policy Research Institute. <http://www.ifpri.org/publication/successes-african-agriculture-1>
- Lester Brown. 2004. Outgrowing the Earth: The Food Security Challenge in an Age of Falling Water Tables and Rising Temperatures (http://www.earth-policy.org/images/uploads/book_files/outch03.pdf)

- Steenbergen, F. van, A. Tuinhof, and L. Knopp. 2011. *Transforming Landscapes Transforming Lives: The Business of Sustainable Water Buffer Management*. Wageningen, The Netherlands: 3R Water Secretariat.
http://www.hydrology.nl/images/docs/ihp/nl/2011.08_Transforming_Landscapes.pdf
- Steenbergen, F. van, and A. Tuinhof. 2010. *Managing the Water Buffer for Development and Climate Change Adaptation*. Wageningen, The Netherlands: 3R Water Secretariat.
http://www.bebuffered.com/downloads/3Rbook_2nd_edition_webversion.pdf

Other reading material will be posted on RamCT.

Evaluation:

Leading a class discussion	10%
Participation (in class and online)	15%
Term paper	40% (including 5% for the outline, 10% for the presentation, and 25% for the term paper itself)
Interview write-up	15%
Opinion piece	20%
TOTAL GRADE	100%

Each student will be a primary discussion leader on a case study or reading assignment (10%). Students will be notified of their discussion dates and topics in advance so they can prepare for this assignment. Guidance on leading discussions is available on RamCT.

In addition, overall participation in class and online will be worth 15%. Every week there will be 1-2 online discussion prompts. In order to get full credit for online discussions, students must post at least twice per week: the first posting by Friday of each week and the second by the following Monday. Posts should be thoughtful and respectful contributions to the discussions. In addition, in class discussion is encouraged and expected in order to both gain and contribute to each other's learning.

There will be three writing assignments, worth a total of 75%, as explained below. Students are encouraged to visit the CSU Writing Center (<http://writing.colostate.edu/>) with early paper drafts in order to improve their writing skills and the end products.

Term paper (40%). Students are required to write and present a term paper evaluating a global challenge in depth and proposing possible solutions or approaches to finding solutions. Preferred topics are due Feb. 9, and must be discussed individually with an instructor prior to approval. A detailed outline of the term paper with at least three relevant references (not web sites) is due March 1 and will count for 5% of your total grade. The paper itself will be due April 19 and will be worth 25% of your grade. An oral presentation of the term paper will occur in the final two weeks of the semester and is worth 10% of the grade.

Interview with a professional who has worked in international agriculture or natural resources (15%). CSU and the surrounding community have a wealth of expertise in international agriculture and natural resources. There are many perspectives on international development, so listening to viewpoints and experiences other than what you hear in the classroom should broaden your understanding of the subject. This assignment involves conducting a 20-30 minute interview, asking questions developed during your online discussions and other questions that may arise, and writing up the results in an approximately 1000-word report. Interviews are usually best when conducted in person, but could also

be done by phone or Skype. Please don't try to conduct your interview via email, which gives little opportunity for interaction. The written summary should include the person's name, affiliation, disciplinary expertise, country(ies) where he/she has worked, how the interview was conducted, responses to questions, and **your personal reflection on what you heard**. The proposed interviewee's name is due in class on January 26. If you need help finding someone to interview, let one of the instructors know. This report is due Feb 16.

Opinion piece (20%). Another important type of writing is the persuasive essay. This writing assignment is a 1000-word opinion piece related to a topic discussed in class but that goes beyond the required readings and in-class discussion. Opinions must be supported with references, data, or in other ways. These essays must demonstrate critical thinking and recommend solutions or research/educational needs in order to reach a solution. Examples will be distributed in class. The topic for your opinion piece is due March 8, and the essays will be due March 29.

Academic Integrity: From the CSU General Catalog

"The foundation of a university is truth and knowledge, each of which relies in a fundamental manner upon academic integrity and is diminished significantly by academic dishonesty. Academic integrity is conceptualized as doing and taking credit for one's own work. A pervasive attitude promoting academic integrity enhances the sense of community and adds value to the educational process. All within the University are responsible for and affected by the cooperative commitment to academic integrity."

This course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog, <http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf> (scroll down to p. 7) and the Student Conduct Code, Article III, <http://www.conflictresolution.colostate.edu/conduct-code>.

The principles and practices of academic honesty will apply to all components of this course: written assignments, online and in-class discussions, and presentations. Plagiarism is of particular relevance in a writing-intensive course like this one. Excerpts from a recent journal editorial addressing the issue are quoted below (Day et al., 2012. *Biosystems Engineering* 111:1).

"Plagiarism, the practice of taking someone else's work or ideas and passing them off as one's own, and its ancillary self-plagiarism, in which individuals republish work that they have already published, represent significant challenges to scientific journals. Authors have a right to be acknowledged as the source of their own work, and new authors must present their work in their own words."

"... journals expect papers to be written in the author's own words. It is their interpretation of the science that is important, and using their own words demonstrates understanding, so significant strings of words should not appear from other published works. Of course some repetition will arise by chance and some because standard phrases or descriptions of equipment or methods need to be reused. However this is not a justification for extracting text from the introduction, review, results or discussion of other papers. If it is important to use the actual words of another author, they should be put in quotation marks and be clearly referenced."

Some links to information on academic integrity and plagiarism are as follows:

Practicing Academic Integrity: <http://learning.colostate.edu/integrity/index.cfm>

Ways to Avoid Plagiarism: http://learning.colostate.edu/integrity/ways_to_avoid.cfm

Writing Guide: Understanding Plagiarism:

<http://writing.colostate.edu/guides/researchsources/understandingplagiarism/index.cfm>

Schedule:

- Jan. 17 — Introductions and Expectations. Global Vulnerability to Soil Degradation (Byrne, Davis)
Reading: Investing in Soils
- Jan. 19 -- Case Study: A Tale of Two Countries, Mali and Niger (Davis)
Reading: Challenge and Threats to Sustainable Food Production
- Jan. 24 — Challenge: Population Growth; Plant Breeding Possibilities and Limitations (Byrne)
Case Study: Learning from the Green Revolution
Readings: James, K.S., 2011. India's Demographic Challenge
Hazell, P.B.R. 2009. Transforming agriculture: The Green Revolution in Asia
- Jan. 26 — Case Study: Keeping Up with New Threats: Biotic and Abiotic Stress
Reading: Dubin, H.J., and Brennan, J.P. 2009. Fighting a "shifty enemy": The international collaboration to contain wheat rusts

INTERVIEWEE SELECTION DUE IN CLASS JAN. 26

- Jan. 31 — Challenge: Balancing Nutrient Surpluses and Deficiencies (Davis)
Case Study: Nitrogen Fertilizer Use in the U.S., China, and Kenya
Readings: Galloway 2008; Vitousek 2009; Millions Fed chapters 14 and 15
- Feb. 2 -- Case Study: Peak Phosphorus (Davis)
Readings: Cordell 2009; Forbes 2009 (<http://www.forbes.com/2009/06/17/king-morocco-phosphate-business-billionaires-royal-conflict.html>); IFPRI Fertilizer Subsidies in Africa 2009
- Feb. 7 — Challenge: Water Scarcity and Quality (Davis)
Readings: Managing the Water Buffer – 3 case studies: West Africa (pp. 64-67), Paraguay (pp. 30-33), and India (pp. 56-58)
- Feb. 9 -- Case Study: Arsenic Poisoning in Bangladesh (Guest speaker: Thomas Borch)
Reading: Fendorf et al., 2010; Millions Fed chapter 10

TERM PAPER TOPICS DUE IN CLASS FEB. 9

- Feb. 14 — Challenge: Smallholder agricultural development and farming systems (Byrne and Davis)
Reading: Do polycultures have a role in modern agriculture?
(<https://www.agronomy.org/files/publications/csa-news/polycultures-in-modern-agriculture.pdf>)
- Feb. 16 -- Case Study: Dietary Energy Balance (Guest Speaker: Dr. Dick Tinsley)
Reading: Tinsley, Chapter 1, Smallholder characteristics

INTERVIEW PAPER DUE IN CLASS FEB. 16

- Feb. 21 — Challenge: Improving "orphan crops", subsistence crops that have been neglected by agricultural research (Byrne)
Reading: Pray, C.E. and Nagarajan, L. 2009. Improving Crops for Arid Lands: Pearl millet and sorghum in India

Feb. 23 -- Case Study: Cassava Improvement in Africa—Biotechnology and Conventional Strategies
(Guest Speaker: Dr. Alfredo Alves)
Reading: Takeshima, H. 2010. Prospects for Development of Genetically Modified Cassava in Sub-Saharan Africa

Feb. 28 —Challenge: Drug Crops (Byrne)
Case Study: Poppies in Afghanistan (Guest Speaker: Mr. Navid Sediqi)
Case Study: Khat in Ethiopia (Guest Speaker: Dr. Mark Simmons)

March 1 -- Coca in Latin America (Byrne)
Reading: Davalos et al., 2009. Disabusing cocaine: Pervasive myths and enduring realities of a globalised commodity. *International Journal of Drug Policy* 20:381-386.

TERM PAPER OUTLINE DUE IN CLASS ON MARCH 1

March 6 —Challenge: Balancing export crops with food crops for domestic consumption (Guest Speaker: Doug Murray)
Case Study: Export Crops in Central America
Reading: Broccoli and Desire pp. 23-41

March 8 – Export Crops in SE Asia (Byrne)
Reading: Coffee vs. Cacao in Vietnam (*JNRLSE* 2005)

OPINION PIECE TOPIC DUE MARCH 8 IN CLASS

MARCH 12-16 SPRING BREAK

March 20 —Challenge: Combating Desertification (Davis)
Reading: *Millions Fed* chapter 7 and *Transforming Landscapes* 3.1 (pp. 16-21)

March 22 -- Challenge: Adapting to Climate Change (Guest Speaker: Keith Paustian)
Readings: To Be Announced

March 27 —Challenge: Combating Deforestation (Davis)
Readings: *Millions Fed* chapter 6; *Trees of Sogolonbougou* case study (*JRNLSE* 1995)

March 29 -- Challenge: Supplying a Growing Demand for Animal Feed (Davis)
Case Study: Soybeans from Brazil to China
Reading: Chapter 3 in Lester Brown

OPINION PIECE DUE MARCH 29 IN CLASS

April 3 —Challenge: Growing Biofuels on Limited Land and Water (Byrne)
Reading: Erback, D.C. and Wilhelm, W.W. 2009. Bioenergy: Energy sources and costs for agriculture

- April 5 – Case Study: Oil Palm in Southeast Asia (Byrne)
Reading: Fitzherbert, E. et al. 2008. How will oil palm expansion affect biodiversity?
- April 10 –Challenge: Growing More Food with Less Water in Colorado (Guest Speaker: Neil Hansen)
Reading: Colorado Ag Water Alliance, 2009. Can agricultural water conservation and efficiency provide the water needed for Colorado’s future?
- April 12 –Challenge: Growing More Food with Less Water in Africa (Guest Speaker: Terry Podmore)
Reading: read about International Development Enterprises’ irrigation technologies (7 links from <http://www.ideorg.org/OurTechnologies/Home.aspx>) and watch videos on Drip Irrigation, Treadle Pumps, and Water Storage (www.paulpolak.com/html/media_video.html)
- April 17 –Challenge: Working with Funders and Partners (Davis and Byrne)
Reading: Feed the Future Strategy (<http://www.feedthefuture.gov/approach/Improved--Nutrition#focus-areas>) and Gates Foundation (<http://www.gatesfoundation.org/Pages/home.aspx>) priorities
- April 19 -- Case Study: Agricultural Development Policy in China and Ethiopia (Guest Speaker: Dana Hoag)
Readings: To Be Announced

TERM PAPERS DUE APRIL 19 IN CLASS

April 24, 26, and May 1 –Student presentations on their term paper topics

May 3 – Wrap-up (Byrne and Davis)