

Global Food Security and Sustainability

Instructor: Navin Ramankutty

Liu Institute for Global Issues and Institute for Resources, Environment, and Sustainability

Course overview

Achieving food security for 10 billion while enhancing the sustainability of our food production system is a major challenge of the next century. This graduate seminar course will discuss papers on the multiple dimensions of this challenge, including biophysical, economic, nutritional, socio-political, and institutional. We will take a global perspective on the issues, drawing upon both global-scale research as well as case studies from different regions of the world to understand the geography of agricultural production, its environmental footprint, and of malnutrition.

Teaching strategy

The course work will consist of the following components:

- Reading and discussing journal articles every week.
- Writing short assignments each week summarizing the articles.
- Facilitating the discussion of one journal article.
- Working on assignments.
- Writing a term paper [~4000 words] on a topic chosen in consultation with instructor.

Prerequisites

Upper-level undergraduate course in agricultural science, ecology, environment, economics, geography, or nutrition, or with permission of instructor.

Learning outcomes

By the end of the course, students will:

1. Be familiar with the literature and key scholars in global food security and sustainability;
2. Have learnt how to critically read and understand papers;
3. Be aware of the key debates and points of contentions in the literature;
4. Be able to identify some of the main concepts;
5. Be familiar with the sources of data and learn how to access them;
6. Be familiar with the analytical approaches in the field;
7. Be able to analyze data to address key issues discussed in class;
8. Have learnt to synthesize knowledge and construct own understanding.

Course format

The course will meet weekly for a single 3-hour session. Each week students will read and discuss 2-4 journal articles. Assignments will be given periodically during the semester. Students will also work on a term paper on a topic of their choice selected in consultation with the professor.

Assessment

You will be assessed on the following criteria:

- Weekly short writing assignments based on journal articles [20%; see next section]
- Weekly discussion of journal articles [15%; see rubric at the end]
- Facilitating paper discussion [10%; see rubric at the end]
- Assignments [30%]
- Term paper [25%]

Assessment strategy

- Short writing assignments: Each week, along with the papers for discussion, you will receive a set of questions about the papers. Written responses will be due at the beginning of each class, and will be graded every week.
- Weekly discussions: Grades will be based on the rubric provided. 3 grades will be given during the course of the semester, roughly once a month.
- Facilitating discussions: You will be responsible for facilitating the discussion of one journal article. Preparing for this requires you to read the article carefully, and prepare a question around which the discussion section can be organized for that paper. The question can be about the paper itself, or it can be a more synthetic question that is based on the paper but addresses a broader question of concern to the course. See rubric for details on how this will be evaluated.
- Assignments: You will work on periodic assignments during the semester. Each assignment will be due two weeks after they are handed out. There will be four assignments in total (see two examples below).
- Term paper: You will work on a term project during the course of the semester, with the topic being chosen in consultation with the professor. You will present your work in the form of a term paper at the end of the semester.

Assignments [2 samples below; 3 in total]

1. ***Does the world have enough food for everyone? How reliant are different countries on trade?***
 - a. **Task:** Examine changes in per-capita crop production and crop supply (i.e., including trade) in different regions of the world since 1961.
 - b. **Methods:** Download national time-series data on food production, food balance sheet, and population from FAOSTAT. Group the data by different regions of the world and analyze changes over time and how they are different among different regions.
2. ***Is food availability a significant driver of food insecurity?***
 - a. **Task:** Examine, using cross-national data, whether food availability is correlated with undernourishment.
 - b. **Methods:** Follow the methods developed by Smith et al. (2000), but using updated data. A spreadsheet with the data will be provided to you.

Readings [preliminary list]

Week 1) Overview: The challenges we face

1. Godfray, H. C. J., J. R. Beddington, I. R. Crute, L. Haddad, D. Lawrence, J. F. Muir, J. Pretty, S. Robinson, S. M. Thomas, and C. Toulmin, Food Security: The Challenge of Feeding 9 Billion People, *Science*, 327(5967), 812-818, 2010.
2. Foley, J. A., N. Ramankutty, K. A. Brauman, E. S. Cassidy, J. S. Gerber, M. Johnston, N. D. Mueller, C. O'Connell, D. K. Ray, P. C. West, C. Balzer, E. M. Bennett, S. R. Carpenter, J. Hill, C. Monfreda, S. Polasky, J. Rockstrom, J. Sheehan, S. Siebert, D. Tilman, and D. P. M. Zaks, Solutions for a cultivated planet, *Nature*, 478(7369), 337-342, 2011.
3. Misselhorn, A., P. Aggarwal, P. Ericksen, P. Gregory, L. Horn-Phathanthai, J. Ingram, and K. Wiebe, A vision for attaining food security, *Current Opinion in Environmental Sustainability*, 4(1), 7-17, 2012.

Week 2) Understanding and measuring food insecurity

4. Coates, J., Build it back better: Deconstructing food security for improved measurement and action, *Global Food Security* (published online),

5. Barrett, C. B., Measuring Food Insecurity, *Science*, 327(5967), 825-828, 2010.
6. Weeks, J., Measuring Hunger, in *Insights*, pp. 18-23, International Food Policy Research Institute, Washington D.C., 2013.
7. Smith, L. C., A. E. El Obeid, and H. H. Jensen, The geography and causes of food insecurity in developing countries, *Agr Econ-Blackwell*, 22(2), 199-215, 2000.
8. The Economist, *Stomach staples: People's spending choices are a good way to assess levels of hunger*, Mar 2011.
9. The Economist, *Not a billion after all*, Oct 2012.

Week 3) Understanding access and distribution

10. Ahmed, A. U., R. V. Hill, L. C. Smith, and T. Frankenberger, Characteristics and causes of severe poverty and hunger, 2020 Focus Brief on the world's poor and hungry people, International Food Policy Research Institute, 2007.
11. Banerjee, A. V., and E. Duflo, The Economic Lives of the Poor, *J Econ Perspect*, 21(1), 141-167, 2007.
12. Misselhorn, A., Is a focus on social capital useful in considering food security interventions? Insights from KwaZulu-Natal, *Development Southern Africa*, 26(2), 189-208, 2009.
13. Reutlinger, S., Malnutrition: A poverty or a food problem?, *World Development*, 5(8), 715-724, 1977.

Week 4) The nutrition challenge

14. Black, R. E., L. H. Allen, Z. A. Bhutta, L. E. Caulfield, M. De Onis, M. Ezzati, C. Mathers, and J. Rivera, Maternal and child undernutrition: global and regional exposures and health consequences, *The lancet*, 371(9608), 243-260, 2008.
15. Saltzman, A., E. Birol, H. E. Bouis, E. Boy, F. F. De Moura, Y. Islam, and W. H. Pfeiffer, Biofortification: Progress toward a more nourishing future, *Global Food Security*, 2(1), 9-17, 2013.
16. Hotz, C., and B. McClafferty, From harvest to health: challenges for developing biofortified staple foods and determining their impact on micronutrient status, *Food and Nutrition Bulletin*, 28(2), S271-S279, 2007.
17. Ahmed, T., M. Hossain, and K. I. Sanin, Global Burden of Maternal and Child Undernutrition and Micronutrient Deficiencies, *Annals of Nutrition and Metabolism*, 61(suppl 1)(Suppl. 1), 8-17, 2012.
18. The Economist, *Hidden Hunger*, Mar 2011.
19. The Economist, *The Nutrition Puzzle*, Feb 2012.

Week 5) Environmental impacts

20. Tilman, D., K. G. Cassman, P. A. MATSON, R. Naylor, and S. Polasky, Agricultural sustainability and intensive production practices, *Nature*, edited, pp. 671-677, 2002.
21. Garnett, T., Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)?, *Food Policy*, 36, Supplement 1(0), S23-S32, 2011.
22. Hoekstra, A. Y., and M. M. Mekonnen, The water footprint of humanity, *Proceedings of the National Academy of Sciences*, 2012.
23. Fischer, J., B. Brosi, G. C. Daily, P. R. Ehrlich, R. Goldman, J. Goldstein, D. B. Lindenmayer, A. D. Manning, H. A. Mooney, L. Pejchar, J. Ranganathan, and H. Tallis, Should agricultural policies encourage land sparing or wildlife-friendly farming?, *Front. Ecol. Environ.*, 6(7), 382-387, 2008.

Week 6) No readings. Summarizing readings to date and taking stock.

Week 7) Economics: Influence of food price, subsidies & tariffs

24. Swinnen, J., and P. Squicciarini, Mixed Messages on Prices and Food Security, *Science*, 335(6067), 405-406, 2012.
25. Ivanic, M., and W. Martin, Implications of higher global food prices for poverty in low-income

- countries, *Agr Econ-Blackwell*, 39, 405-416, 2008.
26. Gibson, J., The crisis in food price data, *Global Food Security*, 2(2), 97-103, 2013.
27. Thomas Hertel, R. K., L Alan Winters, Why WTO agricultural reforms are such a good idea – but such a hard sell, in *VOX*, edited, 2007.
28. Schmitz, A., T. G. Schmitz, and F. Rossi, Agricultural subsidies in developed countries: Impact on global welfare, *Applied Economic Perspectives and Policy*, 28(3), 416-425, 2006.

Week 8) Effective policy responses

29. Audley, J., D. Papademitriou, S. Polaski, and S. Vaughan, NAFTA's Promise and Reality: Lessons from Mexico for the Hemisphere, 2003.
30. Maxwell, S., and R. Slater, Food Policy Old and New, *Development Policy Review*, 21(5-6), 531-553, 2003.
31. Wittman, H., Food Sovereignty: A New Rights Framework for Food and Nature?, *Environment and Society: Advances in Research*, 2(1), 87-105, 2011.
32. von Braun, J., Food insecurity, hunger and malnutrition: necessary policy and technology changes, *New BIOTECHNOLOGY*, 27(5), 449-452, 2010.
33. Haddad, L., Burying nutrition myths and activating choices for our children's development, paper presented at Sustainable Food Security for all by 2020, Bonn, Germany, (2001).

Week 9) Food choices, influence of diet, food waste

34. Furst, T., M. Connors, C. A. Bisogni, J. Sobal, and L. W. Falk, Food Choice: A Conceptual Model of the Process, *Appetite*, 26(3), 247-266, 1996.
35. Lipinski, B., C. Hanson, J. Lomax, L. Kitinoja, R. Waite, and T. Searchinger, Reducing Food Loss And Waste, *World Resources Institute, Washington DC, Working Paper*, 2013.
36. Stokstad, E., Could Less Meat Mean More Food?, *Science*, 327(5967), 810-811, 2010.
37. Parfitt, J., M. Barthel, and S. Macnaughton, Food waste within food supply chains: quantification and potential for change to 2050, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 3065-3081, 2010.
38. Kumm, M., H. de Moel, M. Porkka, S. Siebert, O. Varis, and P. J. Ward, Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use, *Science of The Total Environment*, 438(0), 477-489, 2012.

Week 10) Farming systems 1: Conventional agriculture; Organic farming

39. Pingali, P. L., Green Revolution: Impacts, limits, and the path ahead, *Proceedings of the National Academy of Sciences*, 109(31), 12302-12308, 2012.
40. Connor, D. J., and M. I. Mínguez, Evolution not revolution of farming systems will best feed and green the world, *Global Food Security*, 1(2), 106-113, 2012.
41. Tilman, D., The greening of the green revolution, *Nature*, 396(6708), 211-212, 1998.

Week 11) Farming systems 2: Genetically Modified Agriculture; Smallholder agriculture; Urban farming

42. Gilbert, N., A Hard Look at GM Crops, *Nature*, 497(7447), 24-26, 2013.
43. Altieri, M. A., Agroecology, Small Farms, and Food Sovereignty, *Monthly Review*, 61(3), 2009.
44. Zezza, A., and L. Tasciotti, Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries, *Food Policy*, 35(4), 265-273, 2010.

Weeks 12 & 13: No readings; Panel discussions; Wrap-up

Other potential topics: *influence of climate change, land tenure, food aid*

Rubric for assessing discussion contribution (modified from Anderson & Speck 1998)

- A Comes to class prepared; contributes readily to the conversation but doesn't dominate it: makes thoughtful contributions that advance the conversation; shows interest in and respect for others' views; participates actively in small groups.
- A- Comes to class prepared and makes thoughtful comments when called upon, contributes occasionally without prompting; shows interest in and respect for others' views; participates actively in small groups. An A- score may also be appropriate to an active participant whose contributions are less developed or cogent than those of an A but still advance the conversation.
- B+/B Comes to class prepared, but does not voluntarily contribute to discussions and gives only minimal answers when called upon. Nevertheless these students show interest in the discussion, listen attentively, and take notes. Students in this category may be shy or introverted. The instructor may choose to give such students an A- if they participate fully in small group discussions or if they make progress in overcoming shyness as the course progresses.
- B/B- Participates in discussion, but in a problematic way. Such students may talk too much, make rambling or tangential contributions, continually interrupt the instructor with digressive questions, bluff their way when unprepared, or otherwise dominate discussions, not acknowledging cues of annoyance from instructor or students. Students in this category often profit from a conference with the instructor.
- C-D Students in this range often seem on the margins of the class and may have a negative effect on the participation of others. Students receiving a C often don't participate because they haven't read the material or done the homework. Students receiving a D may be actually disruptive, radiating negative energy via hostile or bored body language, or be overtly rude.

NOTE. This scoring guide assumes regular attendance.

Rubric for assessing facilitation of paper discussion

	<i>Criteria</i>
0	Did not prepare a question for discussion
5	Prepared a poor question for discussion
7	Prepared a question that somewhat facilitated understanding of the paper and topic of the week
9	Prepared a question that greatly facilitated understanding of the paper and topic of the week with some help from instructor.
10	Prepared a question that greatly facilitated understanding of the paper and topic of the week with minimal help from instructor.

Academic Integrity

"The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required, This also means you should not cheat, or mislead others about what is your work. Violations of academic integrity (i.e. misconduct) lead to the breakdown of the academic enterprise, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisor Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences" (UBC website).

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at <http://calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111.0>

Students with disabilities wishing accommodation should contact Access and Diversity at: <http://students.ubc.ca/about/access>