NUT333: Agricultural Science and Policy II  
Fall 2016

Course Overview

Class Time:  Tuesday & Thursday, 10:30am-12:00 noon  
Room 118 Jaharis

Instructors:  Tim Griffin, 617-636-3613 (Timothy.Griffin@tufts.edu)  
Office hours (Jaharis #125): Thursday, 9:00-10:00am and 12:15-1:15 pm

Chris Peters, 617-636-6908 (Christian.Peters@tufts.edu)  
Office hours (Jaharis #124): Tuesday, 12:15 pm – 1:15 pm

TA:  Caitlin Matthews (Caitlin.Matthews@tufts.edu)  
Office hours by appointment – check with me in class or by email

Course Goals:

This course is the second part of a two-semester sequence in agricultural policy and science. The principle foci of this course are the complex systems-level aspects of agriculture, including: pest management, animal production systems, bioenergy and climate change, and food systems.

Who Can/Should Take This Course:

This course is required for AFE students. We have extensively revised this course, as we had the previous course, NUT233 and also NUT215 (Fundamentals of U.S. Agriculture); both are required prerequisites for NUT333. There is a focus on integrative thinking in this course.

Course Website

The course website is on the TRUNK platform (https://trunk.tufts.edu/xsl-portal). If you are registered for this course, you should receive an e-mail with instructions. To log on to the site, enter your Tufts UTLN (same login you use for Webmail) and assigned password. If you have any problems logging onto TRUNK, please let one of us know as soon as possible.

Readings & Resources

The core required readings are posted online, on the course TRUNK site. They are grouped by date. We expect that you will read these in advance of each class. The purpose of the required readings is to supplement the material presented and discussed during class sessions. There will be several occasions when we spend class time discussing a specific reading (we will let you know in advance), but that will be the exception and not the rule.
Assignments & Grading

The assignments and their contribution to your final grade are as follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Contribution</th>
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<tbody>
<tr>
<td>Writing: Memorandum</td>
<td>25%</td>
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<tr>
<td>Analysis: Livestock Concentration</td>
<td>25%</td>
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<tr>
<td>Project: Sustainable Development Metrics</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
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The first writing assignment (Memorandum) will be provided on September 22, 2016 and will be due September 29, 2016.

The data analysis project on Livestock Concentration is described below, as is the end-of-semester project that focuses on metrics within the context of specific Sustainable Development Goals.

The final exam will be an in-class exam, which will contain seven or eight short-answer questions of which you will be required to answer five. We are still working on the precise scheduling of the final exam, to accommodate other classes at the Friedman School.

Academic Conduct:

If you haven’t already, please visit the Tufts website on academic integrity (https://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy). Academic integrity, including avoiding plagiarism, is critically important. Each student is responsible for being familiar with the standards and policies outlined in the Friedman School’s Policies and Procedures manual (http://nutrition.tufts.edu/student/documents).

It is the responsibility of the student to be aware of, and comply with, these policies and standards. In accordance with Tufts University’s policy on academic misconduct, violations of standards of academic conduct will be sanctioned by penalties ranging from grade reduction or failure on an assignment; grade reduction or failure of a course; up to dismissal from the school, depending on the nature and context of any infraction.

In particular, plagiarism will not be tolerated under any circumstance. Avoiding plagiarism is outlined in section IV of the above booklet. We reserve the right to use the anti-plagiarism program, Turnitin.com, to evaluate student work. Please speak with one of the instructors if you have any questions about these policies.

Penalties for late or incomplete assignments:

Please notify one of the instructors at least 48 hours in advance if you know you will be unable to meet a deadline, or as soon as possible in the event of an emergency. Assignments that are turned in late without advanced notice will be reduced by 5% (half a letter grade) the first day they are past due, and 5% each day thereafter. If you anticipate being unable to complete an assignment on time, please contact the instructors immediately.
I. PEST MANAGEMENT

Sept 6  Introduction, Pest problems in Agriculture
Sept 8  Introduction to Pesticides: History, Types & Use
Sept 13 Alternatives to Pesticides
Sept 15 Pesticide Policy: Key Laws & Regulations
Sept 20 Managing Pests, Public Health, and Environmental Health
Sept 22 **Sustainable Intensification Discussion**

II. LIVESTOCK SYSTEMS

Sept 27 Principles of Livestock Production
Sept 29 Alternative Livestock Production Systems

**Intensification memo DUE**
Oct 4 Conventional Livestock; Government Interactions with the Livestock Industry
Oct 6 Grazing Livestock
Oct 11 Economics and Trade in Livestock and Livestock Products
Oct 13 Aquaculture and Fisheries

**Guest Lecturer:** Kyle Foley, Sustainable Seafood Brand Manager
Gulf of Maine Research Institute

Oct 18 Working Session for Livestock Assignment

III. FOOD SYSTEM SUSTAINABILITY

Oct 20 Sustainable Goals as a Framework
Oct 25 Agriculture, Soil, and Climate Change
Oct 27 Agriculture, Water, and Climate Scenarios
Nov 1 Current and Potential Policy Tools for Climate Change

**Livestock concentration assignment DUE**

Nov 3 Energy use and Production in the Food System
Nov 8 **No Class – Friday Schedule on Tuesday**
Nov 10 Biofuels Technology and Policy in U.S.
Nov 15 Water Footprints and Life Cycles Assessments
Nov 17 Population Growth and the Yield Imperative
Nov 22 Perspectives on Local & Regional Food Systems
Nov 24 **No Class – Thanksgiving**
Nov 29 Food Losses and Food Waste

Dec 1 Health, Sustainability and the Argument for Changing Consumption

**Video Presentation of Sustainable Development Goals DUE**
Dec 6 Approaches to Analyzing Food Systems
Dec 8 Feedback and Discussion of SDG videos and concepts

TBD **Final Exam**
Livestock Concentration and Feed Supply

Due Date: November 1, 2016

The production and the consumption of livestock products are consistently controversial topics in discussions of global food security and resource use/degradation. In the U.S., the production systems for the major livestock categories (beef, poultry, and swine) have concentrated geographically in addition to the corporate consolidation that characterizes the sector.

According to the National Cattleman’s Beef Association (NCBA), five (5) states account for nearly 60 percent of beef cattle production in the U.S.\(^1\) As we have discussed in class, the beef production system in the U.S. is bifurcated: the U.S. breeding herd is primarily grazing-based (and thus is directly linked to a specific locale), while the finishing phase is based in feedyards which rely on concentrated sources of energy and protein like corn and soy, respectively, which can be transported at relatively low cost. Similarly, three (3) states account for more than half of hog production in the U.S. (these are Iowa, Minnesota, and North Carolina)\(^2\):

Your tasks are twofold.

1. Outline your approach to address the following question: has geographic concentration of livestock production exceeded the biophysical limits to provide feed for large production facilities?
2. Quantitatively answer that question.

This should be written as a narrative that is analogous to the Methods and Discussion sections of either a peer-reviewed journal article (like those we provide as reference for this assignment) or similar sections in a formal report from a non-governmental organization like Environmental Working Group (EWG) or Environmental Defense Fund (EDF). The description of your approach should identify data sources and how these data are used, and should be limited to 2 pages, single-spaced. Your Results should also be limited to 2 pages of narrative, single spaced, and can include two (2) exhibits (either tables or figures) to support your narrative.

**Geographic choices:**

You should select one of the following geographies for this assignment (they are combinations of livestock sector and a specific, bounded geographic area):

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2. [https://www.aggcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Hog_and_Pig_Farming/](https://www.aggcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Hog_and_Pig_Farming/)
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1. Dairy: the entire state of Wisconsin.
3. Poultry (broiler chickens only): the entire state of Alabama.
4. Swine: the eastern section of North Carolina (the area should include the contiguous counties of Caswell, Alamance, Chatham, Moore, and Scotland, and all counties east of these).

For the purposes of this assignment, you can ignore all other livestock within the area you select. For example, many other livestock products are produced in Wisconsin but your evaluation should focus only on the dairy sector.

**Feed self-sufficiency:**

This is essentially a carrying capacity assessment, to see if crop production is sufficient to meet livestock feed demand, within a defined geographic area. The concept of Regional Self Reliance (RSR; see Griffin et al. 2015) can be used, as it allows for estimation of a ratio of feed demand to feed availability. Griffin et al. (2015) applied this to human food production in the Northeast U.S., and Conrad et al. (2016) extended the concept by estimating an RSR for livestock in the same region. These two publications also provide specific examples of data sources. The estimation of livestock feed demand can come from a number of sources, including the Livestock Model of Peters et al. (2014).

**Relevant Journal Articles (all are posted on Trunk):**

Conrad, Z., N.E. Tichenor, C.J. Peters, and T.S. Griffin. 2016. Regional self-reliance for livestock feed, meat, dairy and eggs in the Northeast USA. Renewable Agriculture and Food Systems. doi: [http://dx.doi.org/10.1017/S1742170516000089](http://dx.doi.org/10.1017/S1742170516000089)


Peters, C., J.A. Picardy, A. Darrouzet-Nardi, and T.S. Griffin. 2014. Feed conversions, ration compositions, and land use efficiencies of major livestock products in U.S. agricultural systems. Agricultural Systems. DOI: [10.1016/j.agsy.2014.06.005](10.1016/j.agsy.2014.06.005)
Sustainable Development Goals and Metrics:
A Video Presentation Assignment
Due Date: December 1, 2016

Oral presentation is a fundamental skill for a wide range of jobs. Mastering this skill takes practice, and this assignment is intended to further hone your ability. Building on the group presentation experience from NUTR 233, the video presentation assignment requires each student to prepare and record a five-minute, polished presentation using Power Point (or comparable professional presentation software). The recordings will be viewed and graded by the instructors. In addition, the recordings will become part of the course material, and students will view a selection of their peers’ presentations as preparation for a discussion session on the Sustainable Development Goals near the end of the semester.

Presentation topic:

The Sustainable Development Goals (or SDGs) were adopted by the United Nations in 2015. Building on the Millennium Development Goals, the SDGs constitute the agenda for sustainable development from 2016 through 2030. Agriculture and food are central to the SDGs from the standpoints of both human well-being and environmental sustainability. Food security and good nutrition are viewed as essential to health and dignity, and agriculture is recognized as both a source of environmental degradation and a possible vehicle for ecological restoration. Thus, the SDGs are an ideal theme to unify the many topics across ASP I and II.

Composed of 17 broad goals and 169 targets, the SDGs seem quite specific at first blush. However, deeper reading of the individual targets reveals that further interpretation is required to be able to measure progress toward the goals. Furthermore, the goals are not binding. Rather, each nation and the civil societies contained therein are expected to work together to try to achieve the goals.

Assignment description:

Your task is to select one of the SDG targets and to describe how progress toward that target could be measured in the context of a specific country. Prepare a five-minute recorded presentation using three to five slides (title slide excluded) that addresses the following issues:

- What target are you addressing?
- What metric should be used to assess progress toward the target?
- Why is this metric appropriate?
- How will it be measured in the country of interest?
Presentations can be recorded using a variety of technologies. We will also provide detailed instructions for recording your video, using several different platforms (WebEx, Explain Everything). In addition, we will have a work session on the assignment later in the semester so all students can become more familiar with the Sustainable Development Goals and the specific deliverables for the presentation.

**Using the recordings in class:**

In pursuing the Sustainable Development Goals, individuals, governments, and civil society will likely confront ethical dilemmas, instances where two (or more) values come into conflict with one another. In other words, we will face trade-offs. Thus, toward the end of the semester, we will devote an entire class session to identifying and trying to resolve such dilemmas. We will address questions such as:

- Are all targets equally important?
- How do you prioritize among targets?
- Which targets go hand-in-hand?
- Which targets might present ethical dilemmas or trade-offs?

To prepare for this session, students will be required to view a selection of other presentations. Each presentation serves as an argument in favor of measuring a particular phenomenon to assess a particular target. In this way, viewing several presentations will illustrate how multiple approaches exist to assessing a single target AND that multiple important targets exist. Any monitoring of food supplies, health status, resource use, or environmental impact costs money, and many may not be easy (or perhaps even possible) to measure directly. Furthermore, once a system of measuring progress is established, how do individuals, governments, and civil societies promote change that supports the goals? Viewing several presentations should help to stoke our conversation.

**A final word:**

You can expect one question on the final exam that requires you to reflect on the Sustainable Development Goals, drawing on your experience across the course.
General Thoughts on Writing

Content:

*Comprehensiveness:* The paper must address all components identified in the assignment. This sounds obvious, but please make sure that you do this!

*Accuracy of the information:* The paper must not include any obvious factual errors and should present the best available data. In general, this means obtaining information from recent articles from respected sources such as peer-reviewed journals and government reports. However, data on some subjects may be sparse, and in such cases, you should pay close attention to possible deficiencies with the available data. Be thorough and identify areas where uncertainty exists.

*Level of precision:* While accuracy is important, writing should also be sufficiently precise. Detail can give the reader a clear picture of concepts you are trying to describe. For example, you might define “sustainable land use” as land management that can be continued indefinitely. This statement is too vague, so you could provide an example that illustrates the point. You might say, “Sustainable land use implies reducing erosion from agricultural practices to levels comparable with natural ecosystems, such as native grasslands or forests.” The level of detail required depends on the audience and how central a concept is to the purpose of the paper.

*Communication of the information:* Papers should be well-organized, and main points should be clear. The assignment will be judged on the relevance of the data to the author’s main points and how well these data strengthen the author’s arguments.

Style:

*Clarity and brevity:* Given the strict page limits of most assignments, the efficiency of one’s writing dictates the depth to which the subject can be covered. Sentences should be unambiguous, and ideas should flow in a logical manner. Good use of section headings can help to organize the paper and save space.

*Word choice:* When possible, use a variety of words to describe the same action or object. A good example would be using the synonyms decrease, reduce, and lessen. A poor example would be to use the words “soil” and “dirt” synonymously.

*Voice:* Good use of the active voice makes writing more engaging. Avoid the use of the passive voice wherever possible.

*Grammar:* Technical writing requires both proper grammar and correct spelling. Be sure to check all words highlighted by the spell-check and grammar-check tools.

*Bibliographic style:* The citation style must be consistent throughout the paper. Either author/year or numerical citations are acceptable. The reference list must be placed at the end of the document and is not counted toward the page limit. **Footnotes are not permitted.**