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, 12:15 pm – 1:15 pm

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

Teaching Fellow: Nayla Bezares (Nayla.Bezares@tufts.edu) Office hours TBD

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, climate change, and the sustainability of the food system.

Who Can/Should Take This Course:

This course is required for AFE students. The material builds on concepts from NUTR 233 (Agricultural Science and Policy I) and also from NUTR 215 (Fundamentals of U.S. Agriculture). Hence, both NUTR 215 and NUTR 233 are required prerequisites for NUT333. There is a focus on integrative thinking in this course.

Course Website

The course website is on the CANVAS platform (https://login.canvas.tufts.edu/). 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. In addition, you will need to use a second method of verification if you are enrolled in Tufts’ two-factor authentication system (https://it.tufts.edu/2fa). If you have any problems logging onto CANVAS, please let one of us know as soon as possible.

Readings & Resources

The core required readings are posted online, on the course CANVAS 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:

- Persuasive Writing: Op-Ed 25%
- Analysis: Livestock Concentration 25%
- Participation: Reflections and Interviews 20%
- Final Exam 30%

Each of the assignments is described in detail below. 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.

Classroom Conduct & Participation

Our number one priority for this class is to maximize your learning and long-term retention related to the above objectives. We aim to do this by creating a dynamic, active learning environment together with you. There will be frequent in-classroom discussions and activities, and it is critical that you do two things 1) actively and respectfully participate and 2) read or watch required materials prior to coming to class.

You can enhance your learning by participating actively and taking notes thoughtfully and selectively. Using a laptop to take notes will allow you to capture more information, but you may cognitively process, and thus retain, less information. As such, we encourage hand-written but permit electronic note taking. Laptops should not be used for personal purposes during class. Finally, please turn off your cell phone prior to the start of each class.

Academic Integrity

Each student is responsible for upholding the highest standards of academic integrity, as specified in the Friedman School’s Policies and Procedures Handbook and Tufts University policies (http://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

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.

Accommodation of Disabilities

Tufts University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to make arrangements for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

Diversity Statement

We believe that diverse student experiences and perspectives are essential to deepening our collective knowledge in this course. We consider it part of our responsibility as instructors to address the learning needs of all students in this course. It is our intent to present materials respectful of diversity: race, ethnicity and national origins, gender and gender identity, sexuality, socioeconomic status, religious beliefs, ability, political preference, and age, among other personal characteristics. Your suggestions on how we can improve are encouraged and appreciated.

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.
NUT333: Agricultural Science and Policy II
Fall 2019

Course Schedule*

I.  **PEST MANAGEMENT**

   Sept 3  Introduction; Sustainable Intensification Discussion
   Sept 5  Pest Problems and Management in Agriculture
   Sept 10 Pest Problems and Management in Agriculture
   Sept 12 Pesticide Policy: Key Laws & Regulations
   **Reflection Post #1 DUE**
   Sept 17 Tradeoffs: Public Health, Environmental Health, and Productivity
   Sept 19 Tradeoffs: Public Health, Environmental Health, and Productivity

II.  **LIVESTOCK SYSTEMS**

   Sept 24 Principles of Livestock Production
   Sept 26 Conventional Livestock; Government Interactions with Livestock Industry
   **Op-Ed Assignment DUE**
   Oct 1  Grazing Livestock
   Oct 3  Alternative Livestock Production Systems
   Oct 8  Livestock and Sustainability: Grass vs. Grain
   **Reflection Post #2 DUE**
   Oct 10 Fisheries and Seafood: Linking Sustainability and Nutrition
   **Revision of Op-Ed Assignment DUE**
   Oct 15 NO CLASS – Monday Schedule

III. **FOOD SYSTEM SUSTAINABILITY**

   Oct 17 Climate Change: Causes and Impacts
   Oct 22 Climate Change: Mitigation and Feedback Loops
   **Reflection Post #3 DUE**
   Oct 24 Climate Change: Current and Potential Policy Tools
   Oct 29 Energy Use in the Food System
   Oct 31 Renewable Energy Production
   **Livestock Concentration Assignment DUE**
   Nov 5  Sustainable Diets: Framework and Analysis Tools
   Nov 7  Sustainable Diets: Arguments for Meat Reduction
   Nov 12 Sustainable Diets: Arguments Against Meat Reduction
   Nov 14 Sustainable Diets: Deliberation
   **Reflection Post #4 DUE**
   Nov 19 Perspectives on Local & Regional Food Systems
   Nov 21 Perspectives on Local & Regional Food Systems
   Nov 26 Food Losses and Food Waste
   Nov 28 NO CLASS – Thanksgiving
   Dec 3  Population Growth and the Yield Imperative
   **Reflection Post #5 DUE**
   Dec 5  Final Discussion on Sustainable Food Systems
   Dec 12  **Final Exam** (10:30-12:00 noon)
Pesticides are widely used in many agricultural systems, in efforts to prevent or mitigate damage from a range of pests. Their use has increased rapidly as a key aspect of agricultural intensification. We have spent a significant amount of time early in the semester looking at two particular pesticide products: the herbicide glyphosate (a specific product); and neonicotinoid insecticides (members of a chemical family). In the U.S., glyphosate is the most widely used herbicide, and neonicotinoids are the most widely used class of insecticides.

Both of these inputs have been and remain controversial, albeit for different reasons. You want to use your expertise to sway public opinion, and you have decided that the Op-Ed page of the New York Times is the ideal venue. Your task is as follows:

1. Select either glyphosate or the neonicotinoids.
2. Identify a course of action for the future use of that product in agriculture. This could be a regulatory ban, for example, but could take other directions.
3. Write your OpEd (!!), recognizing that the primary purpose of an Op-Ed is to persuade (rather than only inform).

There is some good guidance from the New York Times at the following links:


Additional guidance on writing an Op-Ed from the Earth Institute (Columbia University) can be found on our Canvas site.

The first step is to identify a specific issue (environmental or human health, for example). The second step is to clearly state your position (support or opposition) and course of action. In other words, what do you think should happen. If you feel that current regulation is sufficient, you must clearly explain why. If you would like to change the regulations, you must justify!!

The Op-Ed is limited to 800 words.
Overview

In the U.S., production systems for the major livestock categories (beef, poultry, and swine) are concentrated geographically, in addition to the corporate consolidation that characterizes the sector. According to the National Cattlemen’s Beef Association (NCBA), for example, 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 feed yards 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 task is to assess the capacity of a specific geographic region (see choices below) to produce the crops and pasture needed to feed the livestock in that region. In essence, you will enumerate the number of animals in the region, determine the amount of feed crops needed to support those animals, and compare the amount needed to the amount grown. Once you have completed your analysis, you will submit your results in the form of a fully documented table, akin to what would be produced in a scientific paper, a government report, or a formal report from a non-governmental organization like Environmental Working Group (EWG) or Environmental Defense Fund (EDF).

Geographic Choices

Dairy production will be the focus of the assignment, but you can select your own dairy geography! It can be any of the following ten (10) states – which were the top dairy producing states in 2018 based on value of production: California, Wisconsin, New York, Idaho, Texas, Pennsylvania, Michigan, Minnesota, New Mexico, and Washington.

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.

¹ http://www.beefusa.org/beefindustrystatistics.aspx
² https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Hog_and_Pig_Farming/
Methods: Calculating feed self-sufficiency

This is essentially a carrying capacity assessment, to see if (or to what extent) 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).

Read each of these papers. Afterwards, reflect on how the methods used in the three papers can be applied to determine the capacity of your study region to meet the feed needs of its livestock. Sketch out how you propose to conduct your analysis, referring to specific data sources and specific methods or equations from the papers.

You will use this sketch to discuss your approach with one or more peers during the livestock working session. Talking over your approach with other people will likely help to clarify what you are doing as well as catch flaws. Indeed, you may work with other students as you complete your analysis, but you must submit your own work.

Once you have shared your approach with peers, discuss your approach with Dr. Peters for additional feedback and the okay to proceed with your calculations.

Analysis tips

Once you have reviewed your draft approach with a peer(s) and Dr. Peters, you are ready to begin your analysis. Such work tends to be iterative in nature, so one often goes back to the drawing board. Nonetheless, the following tips generally prove helpful:

- Save raw data, such as from USDA Quickstats, in a separate file from your final analysis spreadsheet. You may need to go back to the original version.
- Use spreadsheet best practices. Preparing a spreadsheet is both an art and a science. You want your work to be easy for others to follow. For example, use descriptive column headings and indicate the units.
- Make careful notes of formulae, assumptions, and data sources. This is especially important if a cell includes a calculation that refers to multiple other cells or if it includes a constant that will not be intuitively obvious (e.g. converting pounds to tons).

Deliverables

You will submit two files for this assignment:

1. **Deliverable #1**: a one-page Word document that summarizes your findings. This document will include one table or figure that illustrates the capacity of the study region to meet the food needs of the livestock category in question. The table or figure must
stand alone, meaning that the reader can understand the information presented without Needing to refer to an accompanying text. See the Style guide for the Tri-Societies for guidelines on how to construct tables and figures (https://dl.sciencesocieties.org/files/publications/style/chapter-05.pdf) The document must also include a one-paragraph description of how the analysis was conducted and what it means, similar to an abstract in a scientific paper.

2. **Deliverable #2**: your spreadsheet of calculations. This file will enable Dr. Peters to review your thought process about how you arrived at a given number or conclusion.

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


Topics addressed in NUTR 333 tend to be more open-ended than those addressed in NUTR 233. Material covered in NUTR 233 tended toward the clear-cut. Principles like the causes of erosion and the stages of crop growth and development rest on decades of established research. In NUTR 333, however, we will delve into some topics that are contentious and where the knowledge base is less established and the paths ahead less certain. Accordingly, you can expect fewer lectures this semester than last semester, and the structure of many class sessions will require your input and insight. To this end, participation will be part of your grade in this course. It will be evaluated through a discussion portfolio and through short in-class interviews where you will be the resident expert on a topic.

**Reflections:** (15% of total semester grade)
Reflection posts will be used throughout the course as a way to explore complex topics that lack definitive answers. You will track your learning experience through the *reflections portfolio* – a series of short written reflections in which you respond to prompts on the preparatory readings, videos and other media, or consider what you took away from a specific discussion. Each entry will be relatively brief, usually 200-400 words. Five entries will be submitted throughout the semester. You will receive prompts or questions to consider in advance of each entry. This also helps us to frame the classroom discussion, based on your perspective and interpretation of readings and the like.

**In-class Interviews:** (5% of total semester grade)
As a professional in the field of agriculture, food systems, and sustainability you will find yourself as the resident expert in a diverse variety of topics. As such, you may be asked to provide your expert opinion in a brief, concise format that can be adapted to various forms of media (i.e. print articles, radio shows, symposiums, etc.). Refining your ability to think “on the spot” and respond to field-specific questions when prompted will become a useful skill. Mastering this skill takes practice, and this assignment is intended to further hone your ability. Building on the oral presentation experience from Agricultural Science and Policy I (NUTR 233), this interview-style assignment mimics a media-related interview where you will be asked to provide your expert opinion on a specific topic in less than 3 minutes.

**Interview Topics:**
As outlined in the Course Schedule, this class covers topics in three broad areas: Pest Management, Livestock Systems, and Food Systems Sustainability. Interviews will be based on the topics covered during each class period. Assigned readings, in-class discussions, and additional research can be used to prepare for your interview.

**Deliverables (details are below):**
This assignment will not require any deliverables in addition to the interview. You may prepare notes and use them during your interview.
Assignment Description:
At the beginning of the semester, students will be randomly assigned to provide a brief, 3-minute interview which will be moderated by your instructors. Students will be interviewed at the beginning of each class period; two students will be interviewed per class. Interviewees will be informed of their topic one class prior to their interview.

Although there are no deliverables for this assignment, you will be evaluated based on your ability to provide the following in the course of your interview:

- An overview of the situation related to your topic (i.e. what do we know about the topic?)
- A concise summary of what the scientific community has not been able to establish (i.e. What is missing in scientific research?)
- A rationale for why this gap should be addressed (i.e. Why does this matter?)
- At least two ideas of what can be investigated (research-focused) or developed (technology/solutions-focused) to address the gap you have identified.

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<th>Date</th>
<th>Topic</th>
<th>Interviewee Announcements</th>
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<td>Sunday, Sept 8</td>
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