Ecology of Food

Time: Mon, Wed 9:00 am -10:30 am
Instructor: Jes Hines
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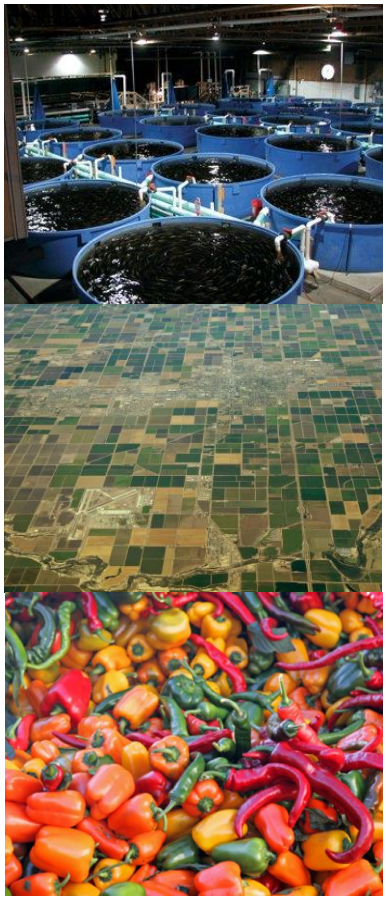


Course Description: Food production is humanity's oldest and most fundamental use of ecological science to manage nature. In this course, students will evaluate the key principles of ecology and evolution as they apply to agricultural ecosystems. The course is divided into units designed to: (1) explore factors that influence the distribution and evolution of species consumed as food, (2) outline the methods used for management of species interactions in agriculture, and (3) evaluate the nutrient and energetic consequences of food production.

Learning Objectives (LO): Upon completion of this course, students should be able to:
LO1) describe the ecological factors that influence growth and production of humans' main sources of food.
LO2) estimate the ecological impact of key farming practices and consumer diet choices
LO3) defend the pros and cons of multiple stakeholders' perspectives as they relate to contemporary controversies in agriculture.
LO4) propose and develop a project that advances understanding of threats to current and future production of food.

Note: Grades will not be inflated; they are a reflection of what you do with the course material and not what you eat or who you are. Students should use the readings, discussions, and projects to reach their own conclusions about the ecological consequences of food production, purchasing, and consumption. This is not a course on human nutrition.

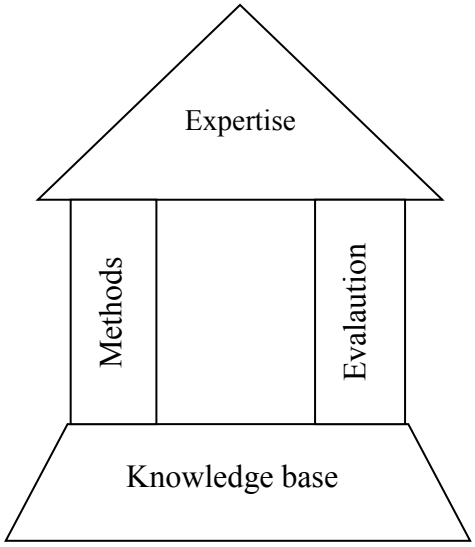
Recommended Text: Agroecology: The Ecology of Sustainable Food Systems. by Stephen R. Gliessman, Eric W., Ph.D. Engles. This text will be heavily supplemented with readings from the primary literature. Pdfs of papers are posted on the course website.

Web Resources- The university website for the course http://blackboard.edu is where you will find assignments, readings, announcements, and discussion questions.

Course Schedule

Date		Lecture Topic	Reading	Exercises
Macro-Ecology and Evolution ***Factors that influence the distribution and evolution of species consumed as food***				
Week 1	Mon	Course overview & Introduction		
	Wed	History of agriculture and land use change		
Week 2	Mon	Biogeography and diversity of food		
	Wed	Case Study #1		Case study 1
Week 3	Mon	Genetic diversity in agriculture		
	Wed	Mutation/expression		Pre-approval complete
Week 4	Mon	Natural/artificial selection		Proposal due
	Wed	Debate 1: Are genetically modified foods safe for humans and the environment?		
Food webs and Biocontrol ***The role of species interactions in the production of food***				
Week 5	Mon	Introduction to Food Web Theory		
	Wed	Natural and Man-made Population Regulation		
Week 6	Mon	Plant chemistry as herbivore defense and food		
	Wed	Case Study #2		Case study 2
Week 7	Mon	Mutualisms above and below the ground		
	Wed	Pathogens		
Week 8	Mon	Biodiversity and biocontrol		
	Wed	Debate 2: Does a vegetarian diet reduce human impact on ecosystems?		
Ecosystem Ecology ***The nutrient and energetic consequences of food production***				
Week 9	Mon	Introduction to the ecosystem concept		
	Wed	Carbon and Climate Change		
Week 10	Mon	Stoichiometry of Food (Fertilizers and NPK)		
	Wed	Case Study #3		Case study 3
Week 11	Mon	Water conservation and irrigation		
	Wed	Nitrogen cycle and Nutrient run off		
Week 12	Mon	Holiday- No Class		
	Wed	Debate 3: Is production of biofuels a good use of agricultural land?		
Week 13	Mon	Project Presentations		
	Wed	Project Presentations		
Week 14	Mon	Project Presentations		
	Wed	Final Exam		

Evaluation of Learning Objectives
Exams, Projects, Grades



Learning Principle	Course Activity	Points (400 total)
Development of Expertise	***Capstone project (25 %)***	***100***
	Proposal	*10*
	Project	*50*
	Presentation	*40*
Integration and Evaluation	***Debates (25 %)***	***100***
	Team performance	*50*
	Individual performance	*25*
	Judging	*25*
Practical Methods	***Case Studies (25 %)***	***100***
	CS 1	*30*
	CS 2	30
	CS 3	30
	Regular Participation	10
Knowledge base	***Final Exam (25 %)***	***100***
	Multiple Choice	25
	Short Answer	40
	Calculations	25
	Essay	10

A=100-90%, B=89.9%-80, C=79.9%-70, D=69.9-60%

Final Exam (Learning Objective 1): The goal of the exam is to ensure that students understand and remember the information presented in the lectures and assigned readings. The exam includes multiple choice, short-answer, calculations, and essay questions.

Case Studies (Learning Objective 2): The goal of the case studies is for students to obtain practical experience applying information presented in class to focal ecological problems that constrain food production. Case Studies give students the opportunity to receive regular feedback and to assess their comprehension of concepts presented in lecture. Exercises include calculations of energy budgets, and estimations of ecological impacts of focal agricultural practices. Each Case Study should be turned in to the course website in advance of class on the due date. Scores will be based on accuracy and substance of response. No late work will be accepted. Regular participation in class will reinforce learning and will be scored in this learning objective.

Debates (Learning Objective 3): The goal of the debates is to ensure that students can identify and communicate the arguments and controversies surrounding provisioning of food for growing human population. Each debate consists of teams of students arguing for or against the focal controversial issue during a formal debate and a round of questions posed by the judges. There are three debates total. Each student will be assigned one debate in which they will develop and present their arguments (performance), and one debate in which they will evaluate the arguments presented by their peers (judging).

Performance in Debate (75 points): Students will be assigned a debate and a side (pro or con). Each member of the team will develop their own argument, and integrate their perspective with

members of their team to formulate and present a well-reasoned argument. Each member of the team will receive a score based on performance of the team (50 points) and individual performance (25 points). *Team performance* will be based on a combined score assessed by the instructor and the students serving as judges. *Individual performance* will be scored based on a one page written summary outlining the key arguments contributed and developed by each student. All performance will be scored based on logic, accuracy, breadth, and depth of arguments and responses.

Judging Debate (25 points): Each student assigned to judge a debate will be responsible for asking one challenge question to each team after the formal debate. Judges will evaluate and score arguments, counter-arguments and answers to questions presented by both teams.

Capstone Project (Learning Objective 4): The goal of the capstone project is for students to develop expertise on a chosen topic and to prioritize how that expertise should be applied to best address issues related to current and future production of food. Format of the project is flexible, but must be approved in advance. Students can work individually or as part of a team. Individual roles on teams should be clearly defined and justified during the project proposal stage.

Proposal (10 points): Each student/team should meet with the instructor to get feedback and approval of their project. Subsequently, each student/team will turn in a one page proposal that identifies the background, methods, and predicted outcome and impact motivating the project.

Project (50 points): A hard copy of the project is due on 30 Nov for all projects. Projects will be graded by the instructor based on logic, accuracy, breadth, depth, and impact of the project.

Presentation (40 points): Each student/team will present their project in 15 minutes (12 minute oral presentation and 3 minutes for questions) during the last two weeks of class. Presentations will be graded based on clarity, organization, content, and impact of the project.

Examples of potential projects include:

- Education: design curriculum and give a guest lecture
- Primary Research: Carry out an experiment related to production of an agricultural crop
- Synthesis Research: write a review or carry out a meta-analysis to evaluate threats to food production
- Communication: Produce a film documenting a controversial food production issue
- Evaluation: Prepare an environmental impact statement of a policy change
- Creative alternatives are appreciated and will be given due consideration

ADA Policy:
During the first week of class students with disabilities needing academic accommodation should register with the Student Disability Resource Center, and bring documentation to the instructor describing what kind of accommodation is needed.

Honor Code:
Students are expected to understand and to uphold the Academic Honor Code: www.honorcode.edu