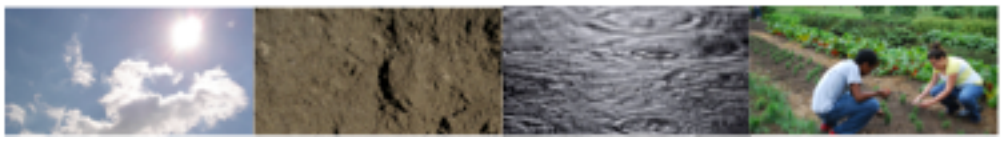




*Virginia Tech*

# Ecological Agriculture: Theory and Practice
# ALS 3404
# Fall 2013


## Course Overview

Presents an overview of historic and modern agricultural practices. Surveys the principles of ecology in the context of managed ecosystems, civic agriculture, and food systems. Explores ecologically based practices and their use in holistic and integrated agricultural systems. Pre: ALS 2204 (2H, 3L, 3C).

## Learning Objectives

Having successfully completed this course, the student will be able to:

- Evaluate the differences within and between sustainable agriculture systems, and how different systems arise from the particular ecologies of their origin
- Compare and contrast natural and managed ecosystems
- Analyze the role of basic ecological principles in sustainable agricultural practices
- Critically define the role of local adaptation in creating ecologically sound agriculture practices
- Construct concept maps or models of farming system using systems thinking
- As members of a collaborative learning team, construct a three year integrated farm plan using ecologically based practices
- Using principles developed in the class, assess and critique farm plans from the ecological, economic and social perspectives

**CRN:** 90304

**Schedule:** M, W 10:10 – 11:00 a.m.
Friday 11:15 a.m. - 2:00 p.m.

**Location:** 246A Smyth Hall

**Instructor of Record:** Jacob Barney
Department of Plant Pathology, Physiology, & Weed Science
435 Old Glade Rd
(540) 231-6323
jnbarney@vt.edu

**Office hours:** By appointment

## Collaborative Teaching Team

This course will be co-taught be a team of Virginia Tech faculty, staff, and students who comprise a cross-campus, multidisciplinary group involved in civic agriculture and food system research, education, and outreach. This team is part of a new initiative at Virginia Tech responsible for developing the *Civic Agriculture and Food Systems* (CAFS) minor in the College of Agriculture and Life Sciences.


| | | | |
|---|---|---|---|
| **Co-Instructors:** | Ozzie Abaye | CSES | cotton@vt.edu |
| | Steven Hodges | CSES | hodges@vt.edu |
| | Tom Kuhar | ENT | tkuhar@vt.edu |
| | Hannah Scherer | AEE | hscherer@vt.edu |
| | Cindy Wood | APSC | piglady@vt.edu |
| | Pete Zeigler | ALS | pzeigler@vt.edu |

**Graduate Teaching Assistant:**

| | | | |
|---|---|---|---|
| | Larissa Smith | PPWS | lls14@vt.edu |


## ALS 3404 Community Partners

The ALS 3404 collaborative teaching team is coordinating with several community partners who are engaged in civic agriculture and food system activity. These principal partners play an important role, locally and regionally, in the civic agriculture production, distribution, health and nutrition, and food waste management. Throughout the course, we will be visiting several community partner initiatives to observe ecological principles as they are put into practice.

The inclusion of community partners in this course reflects our commitment to:

- Strengthening partnerships between the university and the community,
- Enhancing experiential learning activities, and
- Developing student and partner capacity for sustained community engagement

## Justification for Course: Why Ecological Agriculture?

ALS 3404, Ecological Agriculture: Principles and Practice, is a required course for the Civic Agriculture and Food Systems minor. This course consists of two lectures per week plus a 3-hour block to provide an integrated experiential learning environment that allows for collaboration with university and community partners to enhance understanding and application of ecological agriculture concepts for agricultural and food system practices.


## Course Format

Using a mix of traditional and **experiential learning formats**, this course is designed to help students gain transdisciplinary knowledge and skills about civic agriculture by directly involving students in civic agricultural experiences that occur in the everyday world in which we live and work. The goal is to integrate new experiences into what students already know so that they can more critically apply concepts and activities into personal and professional practice. This means we will be using a variety of teaching and learning formats that differ from traditional classroom instruction, including: small/large group discussion; critical reflective writing; case studies; guest speaker dialogue; collaborative work; and numerous, hands-on fieldwork activities and field trips.

## Course Assessments *(Assignment guidelines and grading criteria are posted in Scholar)*

**Participation**

Each participant will have an opportunity to critique their own course participation at the end of the term. Participation will comprise 10% of your final grade. The collaborative teaching team reserves the right to amend this grade.

**Written Analysis and Reflections (Critical Reflection Statements)**

- Four written assignments
- Final ePortfolio Critical Reflection Statement

Students will develop reflective responses that capture main points of the reading(s) and course themes. Students are encouraged to bring in points of view, ideas, and commentary that capture the learning that is taking place as students make progress toward their final project.

An additional critical reflective statement on how the course has contributed to your Capstone project will be required at the end of the course for inclusion in the ePortfolio (next section).

**ePortfolio and Matrix**

- Final Critical Reflection
- Time Log

The purpose of the ePortfolio assignment is to allow students to showcase the connections between what is learned in class to experiences gained in the community in order to demonstrate personal growth and professional development. The ePortfolio can be viewed by internal (i.e., faculty writing you recommendations), and external audiences (i.e., prospective employers, community partners) to represent your perspective on civic agriculture and food systems as well as knowledge, skills and interests).

A user's guide is posted on the ALS eP-CAFS Scholar site which you all should be able to access in Scholar. Additionally, the ePortfolio home page has video resources on getting started. Visit the ALS ePCAFS site in Scholar for guidelines/rubric and assignment due dates.

**"The Farm"**

This course is designed around the idea of understanding the ecology of natural and managed systems, and applying them to agroecosystems. Thus, a major focus of the course, and your grade (50%), is a virtual farm "located" at Kentland. There are four modules to "The Farm" that will be completed throughout the semester by each student. Each module follows the content from class that comprises information on the principles of each topic followed by practical information that will be useful to implement the class project. Your final exam will be to integrate The Farm modules and write a SARE grant to fund a "side-project" adding economic and ecological vitality to your Farm, and will consist of a written paper and a presentation. Each group will prepare and present their final plan to the class for discussion and critique as part of the course final. This presentation will focus on how you justify your choices, and how the plan adheres to ecological principles.

**Fieldwork Experience**

Students will actively participate in organized service-orientated experiences that meet needs of the community partner selected for their CAFS Capstone experiences (CAFS minors). Students taking the course and not enrolled in the minor (thus without a Capstone Partner), will be expected to work with one of our core community partners. These are currently: ***Hale Y-Community Garden, Kentland Farm, Student Garden at Smithfield, the Farms and Fields Project through Virginia Tech's Dining Services, and Glade Road Growing.*** All students will be expected to fulfill at least 10 hours of fieldwork experience using civic engagement protocol. This protocol outlines a community development process that is to help guide student learning for sustained social change: stakeholder identification, relationship building, community capacity, and reciprocity.

**NOTE:** There will be an opportunity throughout the semester for students to visit other Civic Agriculture and Food Systems (CAFS) Minor project partners through co-curricular activities, including farm work days, local food project volunteering, and farmers market vendor assistance. Students are encouraged (but not required) to participate in these activities above and beyond

their 10 hours of required fieldwork. Students are responsible for their own travel and communication responsibilities with CAFS Minor project partners.

## Course Evaluation

| Assignment | Points |
|---|---|
| **Participation Grade (10%)** | **100** |
| **Critical Reflection Statements (4 @ 30 pts) (12%)** | **120** |
| **Soils Module (8%)** | **80** |
| **Farm components (4 @ 50 pts) (20%)** | **200** |
| **Fieldwork Experience (15%) and ePortfolio log** | **150** |
| **Final Farm Plan Project Report (20%)** | **200** |
| **Final Farm Project Presentation (10%)** | **100** |
| **Final Critical Reflection Statement (ePortfolio) (5%)** | **50** |
| **Total Possible Points** *Final grades are based upon a percentage of 1000 total points.* | **1000** |

| Evaluation Scale | |
|---|---|
| **A** | **100-93.0** |
| **A-** | **92.9-90.0** |
| **B+** | **89.9-87.0** |
| **B** | **86.9-83.0** |
| **B-** | **82.9-80.0** |
| **C+** | **79.9-77.0** |
| **C** | **76.9-73.0** |
| **C-** | **72.9-70.0** |
| **D+** | **69.9-67.0** |
| **D** | **66.9-63.0** |
| **D-** | **62.9-60.0** |
| **F** | **< 60.0** |

## Course Grading Criteria and Expectations

***Be prepared***. Evaluation criteria of course work comprises accuracy, depth, and comprehensiveness; logic and organization of thought and writing; and clarity of writing and presentation. In all submitted work, course participants must present convincing arguments with suitable research and literature. It is also an important course expectation that participants come to each class with sufficient command of the reading assignments to discuss them in depth. This means that during every class session, each of us will have read the material assigned and be prepared for class discussion and activities.

***Written Work Policy***. The American Psychological Association's *Publication Manual* (6th edition) is the recommended style manual for written work. Papers and written assignments with minor grammar violations and *Publication Manual* requirements will be marked accordingly. Written work comprising serious composition and/or citation violations will not be reviewed. As part of Virginia Tech's Principles of Community, participants should avoid using sexist, gender-exclusive, racially prejudiced, and other forms of discriminatory language in all course work.

***Quality counts more than quantity***. Engaged and courteous participation by all course participants is expected. It is essential that all participants actively contribute to class discussions and activities, while exercising respect and restraint.

***Attendance is required.*** Course participants are expected to come to class. Please contact me ASAP by email or office phone if you cannot attend class. Absences will only be excused in the event of medical illness or immediate family emergency. In the event of a planned absence, such as a professional obligation or religious holiday, participants are expected to inform me at least one week prior to the date of nonattendance. More than one unexcused absence could result in course failure. Be courteous to others by arriving on time to class and silencing cell phones.

***Late assignments cannot earn full credit.*** Five points will be deducted for each calendar day an assignment is turned in past its due date. Course incompletes are available only for medical emergencies (i.e., personal and immediate family).

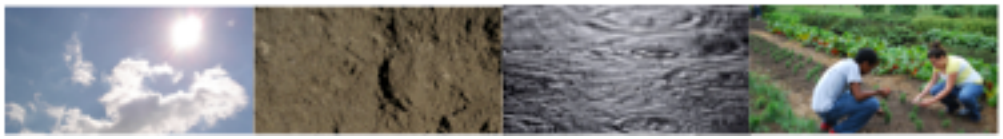
***Policy on Academic Integrity.*** Each participant in this course is expected to abide by the *Virginia Tech Honor System*. It is a university-wide expectation that written work submitted by a participant in this course for academic credit will be the participant's own work. For full information on the Undergraduate Honor System, please visit http://www.honorsystem.vt.edu/

***Learning Needs***. Any participants with special needs are encouraged to consult with me about those needs. Please consult with me as soon as possible so that we can work together to make the necessary accommodations. Anything you discuss with me will be held in strictest confidence. Additional information about assistance for special learning needs for all Virginia Tech students can be located at the office of Services for Students with Disabilities (SSD), 250 S. Main Street, Suite 300; Mail Code (0185); 231-0858 (V); 231-0853 (TTY); www.ssd.vt.edu.

## Course Materials

**Assigned Readings will be posted on the class Scholar site.**

**Scholar:** https://scholar.vt.edu/portal; Ecological Agriculture Fall 2013

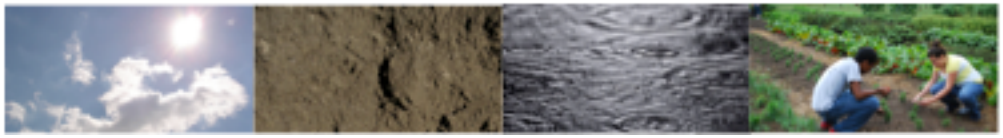


*Civic Agriculture & Food Systems*

| Week | Monday - Principles | Wednesday - Practice | Friday – Field trip, presentation, discussion | Assignment | Readings (posted prior Friday) |
|---|---|---|---|---|---|
| 1 | **Aug 26:**<br>1. Introductions<br>2. "Lab"<br>3. Field work<br>4. Critical reflections<br>5. Field trips<br>6. THE FARM<br>7. Grant proposal<br>8. Pre-test<br>(Team) | **Aug 28:**<br>Ecosystems<br>(Steve) | **Aug 30:**<br>Student Presentations:<br>Emergence of Agriculture | **Research a traditional agricultural system** | **READ:** Cox and Atkins, *Ecological features of intensive agriculture*<br>**READ:** Altieri, *Examples of traditional farming systems* |
| 2 | **Sept 2:**<br>Impacts of Land Use<br>(Hannah) | **Sept 4:**<br>Soil Characteristics and Their Relationship to Land Use Practices<br>(Hannah) | **Sept 6:**<br>**Field trip**: Kentland<br>• Natural and Agricultural Erosion Rates (Hannah)<br>• Using SoilWeb (Hannah)<br>• Soil pits and sampling (Steve) | Sept 4: Pre-work: What is soil? (Due Sept 4)<br><br>Sept. 4 Follow-up homework: Soil Compaction (Due Sept 6)<br><br>Sept. 9 Pre-work: Factors that contribute to soil erosion (Due Sept 9) | **READ:** Lamb et al., *Soil health*<br>**READ:** Wortman et al., *Management to Minimize and Reduce Soil Compaction*<br><br>**Reference:** Magdoff and van Es, *Better soils for better crops; selected sections*<br>**Reference:** Baldwin, *Soil quality considerations for organic farmers* |

| Week | Monday - Principles | Wednesday - Practice | Friday – Field trip, presentation, discussion | Assignment | Readings (posted prior Friday) |
|---|---|---|---|---|---|
| 3 | **Sept 9:** Predicting the Effects of Climate Change on Soil Loss (Hannah) | **Sept 11:** Mitigating effects of Climate Change on Soil Loss (Hannah) | **Sept 13:** **Field trip**: Kentland • Insects (Tom) • Weeds (Jacob) | Soils Module Assessment **(Due Sept 18):** *Complete fact sheet discussed in class on Sept. 11* | **READ:** TBA |
| 4 | **Sept 16:** How plants work (Jacob) | **Sept 18:** Genetics, plant breeding (Jacob) | **Sept 20:** Discussion: GMOs in sustainable agriculture? *NY Times article (oranges), self research* | **CR #1 (Due Sept 20):** *Are GMO's the solution or hindrance to global food security?* | **READ:** TBA |
| 5 | **Sept 23:** Crop Rotation, Cover Crops (Steve) | **Sept 25:** Vegetable production (Johanna) | **Sept 27:** Student presentations: What is organic? Is organic better for humans & environment? | | **READ:** TBA |
| 6 | **Sept 30:** Epidemiology (Pete) | **Oct 2:** Orchards (Greg Peck) | **Oct 4:** Discussion: The Precautionary Principle | **"The Farm #1" (Due Sept 30):** Crop Rotation Plan (Cash & Cover Crops) | **READ:** Galvani *Epidemiology meets evolutionary ecology* **READ:** CAST *Impact of the Precautionary Principle on Feeding Current and Future Generations* |

| Week | Monday - Principles | Wednesday - Practice | Friday – Field trip, presentation, discussion | Assignment | Readings (posted prior Friday) |
|---|---|---|---|---|---|
| 7 | **Oct 7:** Forages (Ozzie) | **Oct 9:** Animals (Cindy) | **Oct 11:** Student Presentations: Animal breeds | **CR #2 (Due Oct 11):** Ecologically-managed animals | **READ:** Wilson, L. L. 1997. Sustainability as Applied to Farm Animal Systems. Prof. Anim. Scientist 13:55-60 |
| 8 | **Oct 14:** Animal husbandry (Cindy) | **Oct 16:** Crops and animals (Cindy/Ozzie) | **Fall Break 18 Oct** | **"The Farm #2" (Due Oct 18):** Animal/forage Plan | **READ:** Croney, C. C. et al. 2012. The ethical food movement: What does it mean for the role of science and scientists in current debates about animal agriculture? J. Anim. Sci. 90:1570-1582 |
| 9 | **Oct 21:** Limits to success-Animal pathogens (Pete) | **Oct 23:** Limits to success-Plant pathogens (Pete) | **Oct 25:** **Field trip:** Critters | | **READ:** Koike et al. *Plant disease management for organic crops* |
| 10 | **Oct 28:** Limits to success-Insects (Tom) | **Oct 30:** Insect management (Tom) | **Nov 1:** Student presentations: Insects from Kentland | **CR #3 (Due Nov 8)** Pesticides in sustainable agriculture? | **READ:** TBA |
| 11 | **Nov 4:** Limits to success-Weeds (Jacob) | **Nov 6:** Weed management (Adam) | **Nov 8:** Student presentations: Grower interviews | **CR #4 (Due Nov 8):** Grower interview – Eco-nomical-logical in action | **READ:** ATTRA *Principles of sustainable weed management for croplands* |



*Civic Agriculture & Food Systems*

| Week | Monday - Principles | Wednesday - Practice | Friday – Field trip, presentation, discussion | Assignment | Readings (posted prior Friday) |
|---|---|---|---|---|---|
| 12 | **Nov 11:** Nutrient Management (Steve) | **Nov 13:** Tillage (Steve) | **Nov 15:** Group activity: Making connections – mapping the agroecosystem | **"The Farm #3" (Due Nov 15):** Pest Management Plan | **READ:** TBA |
| 13 | **Nov 18:** Composting (Greg Evanylo) | **Nov 20:** Water quality (XX) | **Nov 22:** Eco-pot luck | **"The Farm #4" (Due Nov 22):** Nutrient Management Plan | **READ:** TBA |
| | THANKSGIVING | | | | |
| 14 | **Dec 2:** Farmscaping (Ron Morse) | **Dec 4:** Climate change (Hannah) | **Dec 6:** Group activity: coordinating your grants | | **READ:** TBA |
| 15 | **Dec 9:** Socio-cultural context (Adam) | **Dec 11:** Eco-nomical-logical | **NO CLASS** | **"The Farm – Grant": (Due Dec 16 noon)** | **Final Presentations** Dec 17 3:35-5:25pm |