AGROECOLOGY II

APBI 360 – W2017 Term 2
Tuesday/Thursday 1:00-4:00 pm
Mcml 256

Course Instructor
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Teaching Assistant (TA):
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Course Description:

This is the second course in the Food & Environment core series. This next experience in agroecology focuses on the application and analyses of integrated plant and animal production systems. The aim of the course is to further enhance your abilities to effectively use the knowledge you acquired in Agroecology I towards refining, enhancing, and ultimately creating new sustainable production systems.

Through this course, we will target your abilities to think critically and skills associated with critical thought. I have included an introduction to Critical Thought within this document. If developing stronger critical thought skills is of interest to you, I highly recommend visiting http://www.criticalthinking.org/.

Students will use Canvas for announcements, assignments and discussions. To reduce costs & waste, all course materials will be made available electronically. If agreed by the class, there will be opportunities for field trips to visit agricultural operations and events.

Learning Outcomes - Agroecology II:

Upon completion, students will be able to:

- Assess the integration of basic ecological services in the context of an agroecosystem's sustainability;
- Illustrate the structures (e.g., biotic and abiotic) and ecological functions (e.g., energy flow, nutrient cycling) of an integrated agroecosystem;
- Choose relevant determinants of crop and animal health within an integrated system;

- Report the impacts and interrelationships between agricultural systems and associated ecosystems;
- Prioritize agroecological principles for an integrated food production system towards maximizing ecological service provision;
- Improve your ability to work efficiently in teams to solve complex problems;
- Demonstrate an ability to reflect on and connect hands-on (i.e., real life) experiences to theoretical learning towards developing problem solving, critical thinking, and leadership skills;
- Effectively and professionally communicate information, in both written and spoken English, using a variety of methods including writing, presenting, and small group discussions.

Suggested Readings (to be read throughout the term):

- Agroecology: the Ecology of Sustainable Food Systems – Stephen Gliessman
- Field and Laboratory Investigations in Agroecology– Stephen Gliessman
- Agroecology: A Transdisciplinary, Participatory and Action-oriented Approach - V. Ernesto Méndez and Christopher M. Bacon
- Various primary literature sources including journal articles, conference and symposia proceedings, and other peer-reviewed publications. Topical journals include:
    - Agriculture, Ecosystems & Environment (Elsevier)
    - Agroecology and Sustainable Food Systems (Taylor & Francis)
    - Agronomy for Sustainable Development (EDP Sciences)
    - BioControl, 2001 (Springer)
    - Journal of Agricultural and Environmental Ethics (Springer)
    - Journal of Agricultural Science (Cambridge University Press)
    - Journal of Agricultural Sustainability (Taylor & Francis)
    - Journal of Applied Ecology (Wiley)
    - Journal of Crop Improvement (Taylor & Francis)
    - Mycorrhiza (Springer)
    - Science (AAAS)
- Plus many more traditionally disciplinary-focused journals as research in agroecology and applied ecology become more common.

Additional Resources:

- The Critical Thinking Community (http://www.criticalthinking.org/)
- The Skills You Need (http://www.skillsyouneed.com/learn/critical-thinking.html)
- Google Scholar (https://scholar.google.ca/)

Grade Profile:

Critical Thinking Assignments (individual) (4x)	35%
Review Presentations by Student Pairs (2x)	15%
Review Paper (individual)	25%
Active Skilled Participation	25%

Grade Component Descriptions:

Listed here is a brief description of each component of the final course mark. For full descriptions of the assignments and their marking rubrics, please see the assignment documents posted on Canvas (still in progress).

Critical Thinking Assignments

These <1000 word written assignments are designed to assess your critical thinking and communication skills. Your submissions will be judged on clarity, relevance, coherence, logic, depth, consistency, and fairness. More specifically, the reader will be asking the following questions:

- Is the question at issue well stated? Is it clear and unbiased? Does the expression of the question do justice to the complexity of the matter at issue?
- Does the writer cite relevant evidence, experiences, and/or information essential to the issue?
- Does the writer clarify key concepts when necessary?
- Does the writer show a sensitivity to what he or she is assuming or taking for granted? (Insofar as those assumptions might reasonably questioned)?
- Does the writer develop a definite line of reasoning, explaining well how he or she is arriving at his or her conclusions?
- Is the writer's reasoning well-supported?
- Does the writer show sensitivity to alternative points of view or lines of reasoning? Does he or she consider and respond to objections framed from other points of view?

- Does the writer show sensitivity to the implications and consequences of the position he or she has taken?

Topics:

- Assignment #1 **Due Feb 8**
    - Research Note: Report on the key challenges and barriers to sustainably scaling agricultural operations.
- Assignment #2: **Due Feb 15**
    - Research Note: Assessing the role of social covenants in agroecology and ICLS.
- Assignment #3: **Due March 15**
    - Opinion Article: The role of Animal Welfare in ICLS; the nexus of welfare and productivity.
- Assignment #4**: Due April 3**
    - Peer editing of one Review Paper

Review Presentations

Each team of two will give three 7-10 min, oral presentations. Each presentation is to cover a different topic pertaining to an integrated crop:livestock system. If desired, each may relate to a common system. However, you may choose to present three unconnected topics. Topics need to be approved by Andrew. The presentations will be recorded and posted for reflection. In addition to Andrew, non-presenting students will also assess the presentations via on-line forms.

Please keep in mind the "Template for Analyzing the Logic of an Article (or presentation)" when constructing your presentations.

Presentation #1: Due Feb 6

Presentation #2: Due March 8

Guiding questions:

1) What is the topic or subject?

2) What are the relevant ecological connections to the topic?

3) What are the ecological services provided or impeded by the topic within an integrated production system?

4) What assessment criteria could be used to assess the impact of the topic on the system's sustainability?

5) How does the topic interact with components within the system?

6) Why did I present on this topic?

7) How does this topic increase my understanding of integrated production systems?

8) Detail key assumptions and implications.

Review Paper Due March 27

Each student will prepare a review of an integrated crop:livestock system (ICLS). The system must be real (i.e., personal knowledge, a published case study, described by a valid source, etc.) and contain a minimum of three trophic levels. The paper should demonstrate your understanding and application of agroecological knowledge and concepts. It should be sufficiently detailed to allow for 'modeling' of the system based on informed and appropriate assumptions. The paper should demonstrate your mastery of the intended learning outcomes. You may assume the reader is familiar with the subject.

Sections (Grade weight):

1) Summary or abstract (<300 words) (10%)

2) Introduction (i.e., context, problem statement) (5%)

3) Literature review (i.e., what information is available that describes your system?) (10%)

4) System Design (60%)

    a. Describe the primary structural components and ecological functions of the system (what does it look like?)

    b. Appraise the primary ecological services driving the system (why did people make it like it is?).

c. Categorize and functionally describe the interactions among components within the system (why are the pieces arranged like they are?).

d. Appraise the connections and flows within the system and between the system and 'beyond' the system (How isolated or independent is it?).

e. Postulate the financial viability of the system based on reasonable assumptions (Could it make money?).

f. Apply class developed sustainability framework and 'calculate' the system's sustainability quotient (How sustainable is it?).

5) Key Assumptions (15%)

a. What key assumptions have I relied on in describing and assessing the system (What blanks did I need to fill in?)?

b. What are the implications for these assumptions if found incorrect (What happens if I'm wrong?)?

Active Skilled Participation

Class attendance is required, and students are encouraged to contribute to class discussion. Participation is the key to a lively class. Twenty-five percent (25%) of the course grade will depend upon contributions to our class sessions. Class participation provides the opportunity to practice speaking and persuasive skills, as well as the ability to listen. Comments that are vague, repetitive, unrelated to the current topic, disrespectful of others, or without sufficient foundation will be evaluated negatively. What matters is the quality of one's contributions to the class discussion, not the number of times one speaks.

Guidelines for Evaluating Critical Thinking from Class Participation (and for the course)

Outstanding Contributor: Contributions in class reflect exceptional preparation. Ideas offered are always substantive, and provide one or more major insights as well as direction for the class. Challenges are well substantiated and persuasively presented.

Outstanding work demonstrates real achievement in grasping what agroecological thinking is, along with the clear development of a range of specific agroecological thinking skills or abilities.

Participation is, on the whole, clear, precise, and well-reasoned, though with occasional lapses into weak reasoning. The work demonstrates a mind beginning to take charge of its own ideas, assumptions, inferences, and intellectual processes.

An outstanding student often analyzes agroecological issues clearly and precisely, often formulates information accurately, usually distinguishes the relevant from the irrelevant, often recognizes key questionable assumptions, usually clarifies key agroecological concepts effectively, typically uses agroecological language in keeping with established professional usage, frequently identifies relevant competing agricultural points of view, and shows a general tendency to reason carefully from clearly stated premises, as well as noticeable sensitivity to important implications and consequences.

Outstanding work displays excellent agroecological reasoning and problem-solving skills. An outstanding student's work is consistently at a high level of intellectual excellence.

Good Contributor: Contributions in class reflect thorough preparation. Ideas offered are usually substantive, provide good insights, and sometimes direction for the class. Challenges are well substantiated and often persuasive.

Good work represents demonstrable achievement in grasping what agroecological thinking is, along with the clear demonstration of a range of specific agroecological thinking skills or abilities.

Good work at the end of the course is, on the whole, clear, precise, and well-reasoned, though with occasional lapses into weak reasoning.

On the whole, agroecological terms and distinctions are used effectively. The work demonstrates a mind beginning to take charge of its own ideas, assumptions, inferences, and intellectual processes.

The student often analyzes agroecological issues clearly and precisely, often formulates agroecological information accurately, usually distinguishes the relevant from the irrelevant, often recognizes key questionable assumptions, usually clarifies key agroecological concepts effectively, typically uses agroecological language in keeping with established professional usage, frequently identifies relevant agroecological competing points of view, and shows a general tendency to reason carefully from clearly stated premises, as well as noticeable sensitivity to important implications and consequences.

Good work displays good agroecological reasoning and problem-solving skills.

Adequate Contributor: Contributions in class reflect satisfactory preparation. Ideas offered are sometimes substantive, provide generally useful insights but seldom offer a new direction for the discussion. Challenges are sometimes presented, fairly well substantiated, and are sometimes persuasive. If this person were not a member of the class, the quality of discussion would be diminished somewhat.

Adequate work illustrates some but inconsistent achievement in grasping what agroecological thinking is, along with the development of modest agroecological thinking skills or abilities.

Adequate work at the end of the course shows some emerging agroecological thinking skills, but also pronounced weaknesses as well. Though some assignments are reasonably well done, others are poorly done; or at best are mediocre.

There are more than occasional lapses in reasoning. Though agroecological thinking terms and distinctions are sometimes used effectively, sometimes they are used quite ineffectively. Only on occasion does adequate work display a mind taking charge of its own ideas, assumptions, inferences, and intellectual processes. Only occasionally does adequate work display intellectual discipline and clarity.

An adequate student only occasionally analyzes agroecological issues clearly and precisely, formulates agroecological information accurately, distinguishes the relevant from the irrelevant, recognizes key questionable assumptions, clarifies key agroecological concepts effectively, uses agroecological language in keeping with established professional usage, identifies relevant agroecological competing points of view, and reasons carefully from clearly stated premises, or recognizes important agroecological implications and consequences. Sometimes the adequate student seems to be simply going through the motions of the assignment, carrying out the form without getting into the spirit of it.

On the whole, adequate work shows only modest and inconsistent agroecological reasoning and problem-solving skills and sometimes displays weak reasoning and problem-solving skills.

Non-Participant: This person says little or nothing in class. Hence, there is not an adequate basis for evaluation.

Non-participant work shows only a minimal level understanding of what agroecological thinking is, along with the development of some, but very little, agroecological thinking skills or abilities.

Non-participant work at the end of the course, on the whole, shows only occasional agroecological thinking skills, but frequent uncritical agroecological thinking. Most assignments are poorly done. There is little evidence that the student is "reasoning" through the assignment.

Often the student seems to be merely going through the motions of the assignment, carrying out the form without getting into the spirit of it. Non-participant work rarely shows any effort to take charge of ideas, assumptions, inferences, and intellectual processes. In general, non-participant thinking lacks discipline and clarity.

In non-participant work, the student rarely analyzes agroecological issues clearly and precisely, almost never formulates agroecological information accurately, rarely distinguishes the relevant from the irrelevant, rarely recognizes key questionable assumptions, almost never clarifies key agroecological concepts effectively, frequently fails to use agroecological language in keeping with established professional usage, only rarely identifies relevant competing agroecological points of view, and almost never reasons carefully from clearly stated premises, or recognizes important implications and consequences.

Non-participant work does not show good agroecological reasoning and problem-solving skills and frequently displays poor reasoning and problem-solving skills.

Unsatisfactory Contributor: Contributions in class reflect inadequate preparation. Ideas offered are seldom substantive, provide few if any insights, and never a constructive direction for the class. Integrative comments and effective challenges are absent.

The work at the end of the course is as vague, imprecise, and unreasoned as it was in the beginning. There is little evidence that the student is genuinely engaged in the task of taking charge of his or her agroecological thinking.

Many assignments appear to have been done pro forma, the student simply going through the motions without really putting any significant effort into thinking his or her way through them.

Consequently, the student is not analyzing agroecological issues clearly, not formulating agroecological information accurately, not distinguishing relevant from irrelevant information, not identifying key questionable agroecological assumptions, not clarifying key agroecological concepts, not identifying relevant agroecological competing points of view, not reasoning carefully from clearly stated premises, or tracing agroecological implications and consequences.

The students work does not display discernable agroecological reasoning and problem-solving skills.

Guidelines for Evaluating Critical Thinking from Class Participation

Critical thinking involves several sequential steps which may allow students to effectively discuss concepts with their peers. As agreed in class, all comments

made by students in the course are subject to an assessment in order to gauge progress and determine a final participation grade. Critical thinking will be assessed on a weighted scale which includes both the level of thought contributed by the student and how well this particular level was achieved. The varying levels of critical thinking are hierarchical with each sequential step reliant on lower levels. Below is a description of 1) the ordered levels of critical thinking and 2) associated criteria used to evaluate how each level was met.

1. **Levels of Critical Thinking (based on Bloom's Taxonomy of Learning; lowest to highest)**
    - **Knowledge (K):** Student recalls or recognizes information, ideas, and principles in the approximate for which they have learned (list, label, name state define).
    - **Comprehension (C):** Student translates, comprehends or interprets information based on prior learning (explain, summarize, paraphrase, describe, illustrate).
    - **Application (AP):** Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction (use, compute, solve, demonstrate, apply construct).
    - **Analysis (A):** Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question (analyze, categorize, compare, contrast, separate)
    - **Synthesis (S):** Student originates, integrates and combines ideas into a product, plan or proposal that is new to him or her (create, design, hypothesize, invent, develop)
    - **Evaluation (E):** Student appraises assesses, or critiques on a basis of specific standards and criteria (judge, recommend, critique, justify)
2. **Criteria used to Evaluate Level of Achievement**
    - **Outstanding (5):** Exceptional preparation, always substantive ideas and major insights, grasping what agroecological thinking is. Whole, clear, precise, and well-reasoned, own ideas, uses agroecological language, identifies relevant competing agricultural points of view, and reason carefully, as well as sensitivity to important implications and consequences. Displays excellent agroecological reasoning and problem-solving skills.

- **Good (4):** Thorough preparation, usually substantive ideas and major insights, grasping what agroecological thinking is. Whole, clear, precise, and well-reasoned, own ideas, uses agroecological language, identifies relevant competing agricultural points of view, and reason carefully, as well as sensitivity to important implications and consequences. Displays good agroecological reasoning and problem-solving skills.
- **Adequate (3):** Satisfactory preparation, sometimes substantives ideas, generally useful insights. Add quality to the discussion. Some, but inconsistent achievement in grasping agroecological thinking. Modest agroecological thinking skills and abilities. Some good and bad assignments, as well. More than occasional lapses in reasoning. Only, occasionally analyzes agroecological issues clearly and precisely. Shows only modest and inconsistent agroecological reasoning and problem-solving skills and sometimes displays weak reasoning and problem-solving skills.
- **Non-participant (2):** Says little or nothing in class, minimal level of understanding and agroecological thinking skills. Uncritical, assignments poorly done, lack own ideas and accuracy, no discipline and clarity. A groecological reasoning and problem-solving skills are not adequate

Unsatisfactory (1): Inadequate preparation, few if any insights, never a constructive direction for the class, work is vague, imprecise, and unreasoned, no substantive ideas, no genuine engagement, no significant effort into thinking.

Late Submission Policy:

A deduction of 10% per week will be applied starting at the due date. Therefore, 1 day late through 6 days late will be penalized 10%. Assignments submitted 7-13 days late will be penalized 20%.

Plagiarism

Plagiarism is using another person's ideas without giving credit and is considered intellectual theft. If you submit or present the oral or written work of someone else (or your own work from another course without getting permission from your instructor) you are guilty of plagiarism. Please ensure that you understand what qualifies as plagiarism before you hand in your assignment. Beware: essays and term papers will be scanned using a program called "TurnItIn" if plagiarism is suspected.

Academic Integrity

Academic integrity is honest and responsible scholarship. As a university student, you are expected to submit original work and give credit to other peoples' ideas. The statements below were drafted by UBC Academic Integrity Resource Centre. See: http://learningcommons.ubc.ca/get-study-help/academic-integrity/

Academic Honesty

Academic honesty is a core value of scholarship. Cheating and plagiarism (including both presenting the work of others as your own and self-plagiarism) are academic offences that are taken very seriously in the Faculty of Land and Food Systems. By registering for courses at UBC, students have initiated a contract with the University that they will abide by the rules of the institution. It is the students' responsibility to inform themselves of the University regulations. Definitions of Academic Misconduct can be found on the following website:

http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,959#10894. If you are unsure of whether you are properly citing references, please ask your instructor for clarification before the assignment is submitted. Improper citation will result in academic discipline.

COURSE SCHEDULE:

The course schedule is subject to changes throughout the term.

General guestions to consider when assessing a specific integrated animal plant production system:

1) What are the goals associated with this designed integrated system?
2) What are the criteria used to assess achievement of these goals?
3) What is this specific structural component?
4) What are the ecological requirements for this component?
5) What is the financial feasibility of this component
6) What are the ecological services provided or impeded by this component?
7) What assessment criteria should be used when considering inclusion of this component?
8) How does this component interact with other components within the system?
9) What assessment criteria should be used to determine this component's contribution to the system's overall sustainability?

Critical Thinking Writing Assignment Weighting Rubric

Clarity	15%
Accuracy	10%
Precision	15%
Relevance	15%
Depth	10%
Breath	5%
Logic	15%
Significance	10%
Fairness	5%
Total	100%

Review Presentation Rubric

Presenters: _____

Date: _____

Poor <<< Excellent

PRESENTATION SKILLS	**1**	**2**	**3**	**4**	**5**
Were the main ideas presented in an orderly and clear manner?	,	,	,	,	,
Did the presentation fill the time allotted?	,	,	,	,	,
Were the visuals appropriate and helpful to the audience?	,	,	,	,	,
Did the talk maintain the interest of the audience?	,	,	,	,	,
Were the conclusions clear and substantive?	,	,	,	,	,
How well did the presenter respond to audience questions?	,	,	,	,	,

KNOWLEDGE BASE					
Was proper background information on the topic given?	,	,	,	,	,
Was the material selected for presentation appropriate to the topic?	,	,	,	,	,
Was enough essential information given to allow the audience to effectively evaluate the topic?	,	,	,	,	,
Was irrelevant or filler information excluded?	,	,	,	,	,
Did the presenter have a clear understanding of the material presented?	,	,	,	,	,

CRITICAL THINKING					
Were the main issues of the topic clearly addressed?	,	,	,	,	,
Were both theoretical positions and empirical evidence presented? .	,	,	,	,	,
Was clear logic used to support the conclusions made?	,	,	,	,	,
Did the presenter make statements about 'next steps'?	,	,	,	,	,
Did the main conclusions of the presentation follow from the material presented?	,	,	,	,	,

OVERALL IMPRESSION ..... _____

COMMENTS

TOTAL SCORE _____ / 100

Talk topics

Abiotic factor
Adaptation
Allelopathy
Alpha diversity
Aquaculture
Aquaponics
Autotroph vs. heterotroph
Beneficials
Beta diversity
Biochemical cycle
Biological nitrogen fixation
Biotic factor
Carbon fixation
Carbon partitioning
Carbon sequestration
Climax (ecological theory)
C:N ratio
Commensalism
Community
Compensating factor
Competition
Compost
Consumer
Cultural energy inputs vs. ecological energy inputs
Cycles
Decomposer
Density-dependent vs. density independent
Detritivore
Diversity
Dynamic equilibrium or balance
Ecological niche
Ecological services
Ecological structure
Emergent properties
Entomophagy
Environmental complex
Generalist vs. specialist
Herbivore vs. omnivore vs. carnivore
Host
Indicators of sustainability
Intercropping
Integrated crop management
Integrated animal and crop system
Limiting nutrient
Mineralization
Mutualism
Networks
Niche amplitude
Niche diversity
Nitrogen cycle
Nutrient cycles
Overyielding
Partnership
Polyculture
Producer
Productivity index

Protocooperation

Solar energy

Trophic structure