

The University of Manitoba  
Faculty of Agricultural and Food Sciences



**COURSE TITLE: Agroecology**

**Course Number AGEC 3510**

**Academic Session** Fall 2011

**Credit Hours = 3**

**Prerequisites and how they apply to this course**

Prerequisite: BIOL2300, BOTN2370, ZOOL2370 or AGEC2370 (Principles of Ecology). The Principles of Ecology course provides the ecological baseline for class discussions and material.

**Classroom Location:** Ellis Building Room 344

**Meeting Days and Class Hours:** Monday, Wednesday, Friday 1:30-2:20pm

**Lab Location:** Ellis Building Room 344      **Lab Hours:** Thursday 2:30-5:30pm

**Department Office location:** Ellis Building 362

**Phone Number:** 474-8153

**Course Web Page (if applicable):** JUMP webpage for notes and notices

**Instructor Information**

**Name & Title:** Dr. Brian Amiro, Chair B.Sc. Agroecology Program and Head, Department of Soil Science

**Office Location:** Ellis Building Room 364

**Office Phone Number:** 474-9155

**Office Hours:** By appointment or drop-in if available, contact me or the Administrative Assistant, Department of Soil Science at 474-8153

**Email Address:** brian\_amiro@umanitoba.ca

**Course Philosophy**

**Students' Learning Responsibilities**

Students are expected to download the instructor's notes prior to the lecture. These are posted on the course JUMP website every weekend for the following week. Students are expected to attend and participate in class and contribute to discussions. Students will be assigned a faculty mentor to help them with their literature review, and they will be expected to communicate with this mentor.

**Why this course is useful?**

This course covers a wide range of topics that address current issues in managed ecosystems. It provides an introduction to concepts with specific examples to examine some issues in detail. It also provides the student with the opportunity to discuss the future of agroecosystems and how our scientific knowledge can help food production to be environmentally responsible and still profitable.

**Who should take this course?**

This course is of interest to students wanting to learn about managed terrestrial ecosystems, especially agricultural ecosystems. Although it is targeted to students in the B.Sc. Agroecology program, it is of interest to students in Agriculture and Environmental Science. In most years, we have a mix of students from different programs. Occasionally, graduate students who want a broad knowledge in this area have taken the course.

### **How this course fits into the curriculum**

This is a core course for the B.Sc. Agroecology degree. Students typically take this course in the third year of their program. It is a pre-requisite for AGEC 4510 and AGEC 4550.

## **Course Description/Objectives**

### **Undergraduate Calendar Description**

Examination of how ecological principles and processes apply to, and function in, managed ecosystems, with emphasis on agricultural ecosystems. Influence of agricultural practices on populations and ecosystem function. Ecological concepts as tools in managing systems. Prerequisite: BIOL2300, BOTN2370, ZOOL2370 or AGEC2370 (Principles of Ecology). 3 credit hours, lectures and laboratories.

### **Instructional Methods**

Lectures and laboratories. A major literature review is required. In addition, students attend a one-day field tour in early September where we explore agroecological issues in different parts of Manitoba.

### **Course Objectives**

Students will learn:

- Ecological workings, Biogeochemical cycling, Energy flow, and Biological interactions in managed ecosystems,
- Principles of sustainability and ecological diversity in managed ecosystems

Students will gain experience on:

- Reading the scientific literature, critically evaluating a subject area of their interest and writing a literature review
- Gaining some practical experience in measurement of the environment using instruments and a datalogger
- Working with spreadsheets to analyze data
- Describing and defending an agroecological issue in a short, concise, verbal communication

### **Learning outcomes**

At the end of this course, students will be able to:

- **Identify practices** that influence agricultural sustainability because of ecological constraints,
- **Critically assess** ecological aspects of agroecosystems and other managed ecosystems, with emphasis on quantitative measures, and
- **Generate ideas** to enhance sustainability of managed ecosystems based on ecological principles.

### **Description of Examinations**

Mid-Term Examination: 50 minutes long in class (Ellis 344).

Final Examination: 120 minutes long during examination period in Ellis 344.

### **Description of Assignments**

#### **Laboratory Units and Schedule**

Two Laboratory reports are due on the days indicated. The expectation is that each laboratory report will not exceed 10 single-spaced pages including figures and graphs. Laboratory reports should have the following elements:

- Introduction
- Methods
- Results

- Discussion
- Conclusions

### **Laboratory 1: Energetics of Agroecosystems: Measurement of energy flow**

1. Sept 15 Experimental planning and instrument concepts
2. Sept 22 or 29. Field setup (Glenlea)
3. **Oct 10, 130pm** Lab report due.

### **Laboratory 2: Modelling Ecosystems**

1. Oct 20. Introduction to ecosystem modelling
2. Oct 27. Group Work Session
3. **Nov 7, 130pm.** Lab Report due

### **Review Presentations**

Purpose: Practice communicating a short synopsis of your work and responding to questions

In Laboratory period, **Nov 17, 2:30-5:30pm**, Ellis 344.

Presentation is 2 to 3 minutes long, verbal with notes, no visual aids. Followed by questions from the audience where a less-than-1-minute response is required.

Elements of the Presentation

- What is your review about?
- Why is the topic important?
- What do we know?
- What don't we know?
- What should we do to improve our knowledge?
- Who will this benefit?

Marking Scheme

- 5 = excellent presentation and responses
- 4 = very good presentation and responses; minor glitches
- 3 = good, but some elements missing
- 2 = inadequate presentation and responses: audience is confused
- 1 = poor presentation and responses: audience could not understand much
- 0 = didn't present

### **Requirements for the Literature Review Paper**

A major literature review paper is required as part of AGEC3510. The purpose of the review is to have the student become knowledgeable about a specific area of Agroecology. The topic of the literature review will be selected by one of two methods:

1. For students majoring in the B.Sc. Agroecology Program, their topic should be consistent with a subject area where they are intending to complete their major project in the course AGEC4540 in their fourth year. They will be advised by their project mentor and they should discuss the subject area with the mentor at the earliest opportunity.
2. For students not currently majoring in the B.Sc. Agroecology Program, they can select a suitable agroecological topic that interests them, upon approval of the course instructor. The instructor will organize a professor to be a mentor for the review and they should discuss the subject area with the mentor at the earliest opportunity.

The review should use primary scientific literature or original documentation and reports as appropriate to the topic. This means that text book material or internet references are normally not appropriate. **A minimum of 10 pages of text** (not including the reference section) is required. Reviews should not exceed 20 pages. The submission should be double-spaced and typed.

Marks will be awarded for completeness of coverage of the literature, effective summarizing of major themes in the literature, and organization and effectiveness of communication of the written document. Check your document very carefully to make sure that your reference list matches items in the text!

By **October 10, 900am**, students must submit to their project mentor a 1-2 page outline of their literature review by email. Their mentor will provide feedback by **October 14**.

By **November 10, 900am**, students must submit to their project mentor a draft of the literature review by email so that they can receive feedback no later than by **November 22**.

The deadline for submission of the final version of the literature review is **December 7, 130pm** by email to the project mentor and to Dr. Amiro on or before that date. Penalties for late reports are 10% per day late on the mark for the paper (i.e., a paper that is 2 days late will be marked out of 80%; a report that is 10 days late will be marked as zero).

#### **Evaluation Criteria used by markers:**

- Use of primary scientific literature or original documentation and reports as appropriate to the topic. Was the right type of literature used?
- Completeness of coverage of the literature. Given the 11 week development time, was coverage sufficient, too superficial, too broad, too narrow?
- Effectiveness of summarizing of major themes in the literature. For the literature used, was content portrayed effectively and summarized well?
- Rhetorical effectiveness. Were arguments well developed and discussion and conclusions logically based?
- Organization of major sections. Were major sections appropriate in content and order, were headings used where appropriate?
- Organization of paragraphs and sentences. Were paragraphs and sentences logically ordered and in the appropriate major section?
- Grammar and spelling. Is the writing generally free from grammatical and spelling errors?
- Reference and citations. Did citations and references correspond, and was reference and citation style consistent and adequate?
- Were the instructions followed? Minimum 10 pages text, double spaced, printed or typed, two copies.
- Overall impression

#### **Suggested Format:**

Introduction: Introduce your subject and tell the audience the purpose of the review. Embed your citations in the text as shown here (Badenov and Fatale 2008).

Topical Sections: Divide the review into sections and subsections to organize your review and make it readable for the audience.

Conclusions: Make some strong conclusions that give the audience the final message.

References: Only list the references cited in the paper. Use a consistent journal format, such as: Badenov, B. and N. Fatale. 2008. More problems with moose and squirrel. Journal of Lower Pottsylvania 23: 46-58.

#### **Assignment Due Dates**

##### **Schedule for Examinations, Reports and Review paper**

<u>DATE</u>	<u>ITEM</u>
Oct 10, 130pm.	Laboratory Report 1 (Energy Flow)
Oct 10, 900am.	Two-page Outline of Review Paper to mentor.
Oct 22.	Mid-term examination
Nov 7, 130pm.	Laboratory Report 2 (Modelling)
Nov 10, 900am.	Draft of review paper to mentor for comment
Nov 17, 230-530pm	Review presentations
Dec 7, 130pm.	Final Review Paper to Mentor and Instructor
Date to be set.	Final Examination

#### **Grade Evaluation**

Mid-Term .....20%

Labs (2)	.....20% (10% each)
Review Presentation.....	5%
Review Paper .....	20%
Final Exam .....	35%

### **Important Dates**

First Day of Classes: Sept 8, 2010

Last Day of Classes: Dec. 7, 2010

Voluntary Withdrawal date for 2011: Nov. 16, 2011.

## **Texts, Readings, Materials**

### **Textbook(s) – Authors, Titles, Edition**

None. Notes will be posted on the JUMP Course site as PDF files at the start of each week.

### **Supplementary Reading**

Reference Book:

Gliessman, Stephen. 1998. Agroecology: Ecological processes in sustainable agriculture. Sleeping Bear Press. ISBN 1-57504-043-3. S589.7.G58. On reserve in the Newman Library, Agriculture Building.

## **Course Policies**

### **Late Assignments**

Penalties for late submission of Laboratory Reports and the Final Review Paper are 10% per day late (i.e., a report that is 10 days late will be marked as zero).

### **Missed Assignments**

Penalties for late submission of Laboratory Reports and the Final Review Paper are 10% per day late (i.e., a report that is 10 days late will be marked as zero).

### **Missed Exams**

A missed mid-term examination needs to be discussed with the instructor to determine the appropriate remedy. A missed final examination will follow the rules outlined in the University Calendar.

### **Academic Integrity**

Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room. Exam cheating can also include exam impersonation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission (see Section 7, p. 29 in the University of Manitoba Undergraduate Calendar 09/10).

### **Some Specific Potential Issues for this Course:**

A literature review is an important part of this course. Students need to discuss potential plagiarism issues with the instructor and mentor to ensure that they understand the appropriate method for citation, and what constitutes plagiarism in a scientific document. If in doubt, check with an instructor!

### **Use of Third Party Detection and Submission Tools**

Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

### **Group Work Policies:**

Students are encouraged to work together on laboratories, but must hand in their own laboratory report.

## Course Content

**Lecture Schedule 2011: Monday, Wednesday, Friday 1:30-2:30 pm.**

<b>Lecture</b>	<b>Date, 2011</b>	<b>Unit Topic</b>
<b>Unit I: Introduction</b>		
1	Fri Sept 9	Introduction: purpose, structure, requirements.
2	Mon Sept 12	The Development of Agriculture and Ecological Principles
<b>Unit II: The Biophysical Environment</b>		
3	Wed Sept 14	Energetics of ecosystems Part 1 (Radiation).
4	Fri Sept 16	Energetics of ecosystems Part 2 (Energy partitioning).
5	Mon Sept 19	Climate and Temperature
6	Wed Sept 21	Hydrology and evapotranspiration Part 1 (water cycle).
7	Fri Sept 23	Hydrology and evapotranspiration Part 2 (ET determination)
8	Mon Sept 26	Irrigation
9	Wed Sept 28	Salinization
10	Fri Sept 30	Wind and Shelterbelts
11	Mon Oct 3	Erosion
<b>Unit III: Biogeochemical Cycles</b>		
12	Wed Oct 5	The Carbon Cycle Part 1 (carbon cycle)
13	Fri Oct 7	The Carbon Cycle Part 2 (soil carbon)
--	Mon Oct 10	Thanksgiving: No class
14	Wed Oct 12	Nutrients
15	Fri Oct 14	Nitrogen
--	Mon Oct 17	Review of first 3 Units
--	Wed Oct 19	Mid-Term (Units I, II, III)
<b>Unit IV: Animal-plant interactions: The ecosystem</b>		
16	Fri Oct 21	Populations
17	Mon Oct 24	Plant-Animal Interactions
18	Wed Oct 26	Energetics of Food Production
19	Fri Oct 28	Pests and Pathogens
<b>Unit V: Management Systems and Issues</b>		
20	Mon Oct 31	Ecology of Weeds
21	Wed Nov 2	Ecological Aspects of Pesticides
22	Fri Nov 4	Population Genetics
23	Mon Nov 7	Organic systems
24	Wed Nov 9	Annual and Perennial systems
--	Fri Nov 11	Remembrance Day: No class
25	Mon Nov 14	Polyculture
26	Wed Nov 16	Manure Management
27	Fri Nov 18	Environmental Farm Plan
28	Mon Nov 21	Precision Conservation
29	Wed Nov 23	Fire in the ecosystem
30	Fri Nov 25	Forestry
31	Mon Nov 28	Agroforestry
<b>Unit VI: The Global Environment</b>		
32	Wed Nov 30	Ecological Footprints
33	Fri Dec 2	Life Cycle Analysis
34	Mon Dec 5	Climate Change
--	Wed Dec 7	Review of course

**Laboratory Schedule:**

<b>Laboratory Date 2011</b>	<b>Topic</b>
Sept 15	Lab 1: Experimental planning and instrument concepts
Sept 22	Lab 1: Field Measurements
Sept 29	Lab1 contingency
Oct 6	Lab 1: Data analysis
Oct 13	How to write your literature review
Oct 20	Lab 2: Introduction to ecosystem modelling
Oct 27	Lab 2: Work on model
Nov 4	No lab
Nov 10	No lab
Nov 17	Review presentations
Nov 24	No Lab
Dec 2	No Lab