

AGEC 2370 Principles of Ecology
Faculty of Agricultural and Food Sciences
Fall 2016

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Office hours: Wednesday 1:00 – 2:00 pm
Thursday 11:30 am –12:30 pm
Other times by appointment only

Course Description: The course will cover at a basic level ecologically important aspects of the environment and interactions between these and organisms in the environment, factors that influence the dynamics of populations, the effect of interactions on populations and communities, characteristics of ecosystems, cycles of energy and materials within ecosystems, and how ecological data is acquired, processed and interpreted.

Prerequisite: Minimum grade of C in BIOL 1020 or BIOL 1021 and BIOL 1030 or BIOL 1031 or the former 071.125

Prerequisite or Co-requisite: STAT 1000 or STAT 1001 or the former 005.100

Lectures: T R, 1:00-2:15 pm, 130 Agriculture

Laboratories: T or W or F, 2:30-5:30 PM, 203 Animal Science/Entomology Building **and** various field sites

Labs begin September 13 – attend the section in which you are registered! (see detailed lab schedule)

Instructional Methods

This course combines traditional lectures, field data collection, laboratory work, in class discussions, and written assignments (laboratory reports).

Course Philosophy

Course goals:

- Demonstrate knowledge of basic principles of ecology including population growth, ecological interactions, succession, and evolutionary change
- Evaluate current global threats to the environment caused by food production demand, habitat loss, overpopulation, pollution, resource consumption, and climate change
- Understand principles of scientific research applied to ecological questions

Expected learning outcomes:

- Apply ecological theories to explain patterns observed in biological systems
- Devise potential solutions for ecological problems using scientific reasoning and ecological principles
- Understand basic data collection and management in ecological studies
- Design, execute and analyze ecological experiments with testable hypotheses.
- Search, find and utilize current literature in ecological journals to augment discussion of ecological studies conducted in class
- Produce reports of ecological studies in a clear, precise, and succinct way.

I Expect you to...

approach this course with academic integrity, take responsibility for your actions and honor your academic commitments. Regular attendance to lectures and labs is essential for success in this course. You are encouraged to ask for assistance whenever you feel it is necessary. You should treat your fellow students with respect and foster a cooperative learning environment where other's ideas are heard and discussed.

You can expect from me...

to be available to help you understand course concepts, materials and assignments. I value your ideas and I will encourage questions and answers to develop them. I do not expect perfection in your answers during class or laboratory discussions, they are meant to foster critical thinking and develop your own understanding of the concepts. I will welcome suggestions about how to improve any aspects of the course.

Required Textbook: Cain, ML, WD Bowman and SD Hacker. 2014. Ecology, 3rd edition. Sinauer Associates, Sunderland, Massachusetts. 596 pp. (previous editions also work fine)

Letter Grade Equivalency:

A+ = >90%; A=80-89%; B+ =75-79%; B=70-74%; C+=65-69%; C=60-64%; D=50-59%; F=<50%.

Course Evaluation:

Mid Term Test (50 min) 20%
 Laboratory Data and Reports 36%
 Attendance and Participation 4%
 Final Examination (2 hrs.) 40%

Attendance and Participation: lecture attendance will be recorded using a sign-in sheet to help to assess class participation. Active participation in lectures and lab will be used to assess class participation. Attendance to laboratories is required.

Schedule for Examinations:

Mid-term Tuesday, October 25, 2016, 1:00 – 2:15 pm, 130 Agriculture
 Final Exam Time and Location TBA, Scheduled by Student Records

Note: To pass the course, students must complete all three items below:

- a) obtain an overall passing mark in the course
- b) submit papers for the midterm exam and the final exam
- c) obtain a passing grade (50%) on the lab report portion.

Late lab reports are subject to a deduction of 10% for each day late. The final exam is cumulative and will include up to 20% of the material previously tested in the midterm exam.

Important Dates

First day of course.....Sept 8, 2016
 Voluntary withdrawal date..... Nov 18, 2016*
 Final day of course..... Dec 8, 2016
 Exam period..... Dec 12 – Dec 22, 2016

* Grades for the midterm and laboratory reports 1-3 will be available before the Voluntary withdrawal date.

UM Learn (<https://universityofmanitoba.desire2learn.com/d2l/login>): Course materials (i.e. lecture notes, laboratory handouts, etc.) will be uploaded to UM Learn, it is your responsibility to learn how to access this page.

Class Communication: You are required to obtain and use your U of M email account for all communication between yourself and the university. The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit: http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf. Please note that all communication between myself and you as a student must comply with the electronic communication with student policy: http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html

I will make an effort to reply to emails within 48 hours. However, questions about information that is in the syllabus, announced during lectures or labs, or can be found in handouts on UML may result in a delayed response.

Lecture notes and other written documents: Lecture notes and other materials will be posted as pdf files on UML. Lecture notes will be posted in two forms: the PowerPoint slides in colour, and a black-and-white outline format. The purpose of the notes is to facilitate keeping up with presentation of class material; notes are not a substitute for class attendance. Notes will usually be posted shortly before the day of the class. The lecture schedule indicates the chapter in the text book that is associated with each topic. Students should read the chapter concerned at about the time the topic is being presented in class. The lectures will highlight important material from the chapter, but supporting information in the chapter will assist with understanding.

Lecture Outline

Introduction to Ecology

What is ecology?	Chapter 1
Adaptation, evolution & experimental design	Chapter 1

The Physical Environment

Climate	Chapter 2
The Biosphere	Chapter 3
Temperature and water variation	Chapter 4
Energy variation	Chapter 5

Populations

Evolution and Ecology	Chapter 6
Life history	Chapter 7
Behavioral Ecology	Chapter 8
Distribution and abundance	Chapter 9
Life tables, population growth and regulation	Chapter 10
Population dynamics	Chapter 11

Population Interactions

Competition	Chapter 12
Predation	Chapter 13
Parasitism	Chapter 14
Mutualism	Chapter 15

Communities

Community characteristics	Chapter 16
Succession	Chapter 17
Biogeography	Chapter 18
Species diversity and richness	Chapter 19

Ecosystems

Production	Chapter 20
Energy flow and food webs	Chapter 21
Nutrient cycling	Chapter 22
Landscape ecology	Chapter 24
Conservation biology	Chapter 23

Note: Tentative schedule subject to modification. Chapters in the textbook cover some topics in more or less detail than will be discussed in lectures, although reading the entire chapter is helpful and those students who do so tend to have a better understanding of the material and do better on exams. **Testing will be based on material, verbal or written, presented in class and in lab.**

Recording of Classes: Alejandro Costamagna and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format without Alejandro Costamagna's permission. Course materials, both paper and digital, are for the participant's private study and research only.

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. Electronic detection tools may be used to screen assignments in cases of suspected plagiarism. You should acquaint yourself with the University's policy on plagiarism, cheating, and examination impersonation as detailed in the General Academic Regulations and Policy section of the University of Manitoba Undergraduate Calendar. Visit the http://umanitoba.ca/student/resource/student_advocacy/ for more information.

Laboratory Information

Laboratory Objectives:

- To provide experience with techniques for measuring a range of ecological variables
- To provide exposure to the problems associated with measuring ecological variables
- To illustrate selected ecological principles
- To introduce the process of scientific research and the primary literature generated

Lab Location: Some labs are held outdoors at various field sites. We will assemble in Room 203 prior to all outdoor labs for a pre-lab talk. These talks will be short and will start promptly at 2:30 pm. Students must be on time for these pre-lab talks or they will miss valuable information concerning lab procedures and may also miss the departure to the field location. We will return to campus by 5:30 pm. There is no lab manual. Information for each lab will be available on-line and **should be printed out in advance and brought to lab.**

Equipment: Most equipment will be provided; however, students may find it useful to have a basic dissection kit (scissors, a ruler, forceps, and a probe), a clipboard or other hard writing surface, squared paper for data sheets and field notes, a pencil or other waterproof writing utensil for taking notes and data in the field. A clear plastic bag that your data sheets fit into is useful to keep them dry while still recording data. Appropriate outdoor clothing such as raingear, gloves, hat and boots would be wise, since **field trips will take place regardless of the weather.**

Working Groups: Students will work in groups of 3-4. All group members must attend and participate in labs. If there is a problem with any particular member not co-operating then feel free to contact the teaching assistant or the instructor. Generally it is better if students form their own groups; however, if you do not have a group, the instructor can assign you to a group. You will remain in the same group of students throughout the term. Please record your group name, letter or other identification feature and your lab day on all written work. **You will need to keep a record of who is in your group and their contact information.**

Laboratory Exercises: There will be six exercises. These will take 9 of the 13 weekly lab slots (*see the attached lab schedule.*) All six lab exercises must be written up and submitted for grading. Keep a copy of all material submitted. Although you will carry out the exercises in groups, **each student will submit an individual report.** Each student is responsible for obtaining all the relevant data from other group members. To that end, students should be sure that they know how to contact their lab partners outside of class time. For some exercises, the data for the entire section or entire class may be pooled.

Laboratory Preparation: Before each laboratory, read the appropriate sections of the textbook. Then read the handout describing the exercise to be sure that you know what is expected of you and that you are ready at the beginning of the lab period to ask questions about anything you need clarified. The pre-lab talk will not go through all the information already available in the handout, so be sure you have **read through the exercise before you arrive.** After reading the handout, plan any data sheets you will need during the exercise, and prepare them ahead of time. When preparing data sheets, use pencil or some other waterproof writing instrument and leave space for extra columns in case you need to revise them.

Laboratory Reports: A report for each exercise must be written up by each student. Keep a copy of all material submitted. The due dates for each report may be found in the attached lab schedule and are typically one week after the completion of all data collection for an exercise. Lab reports will normally take 10-14 days to mark, and once reports have been handed back, no other late reports will be accepted. **There will be lab questions on the midterm and final exam.**

Lab reports should be saved as *.pdf files* (no other file formats will be accepted), with the following name: AGEC2370_section_Last name_Lab (i.e. *AGEC2370_B03_Wilson_Dandelions.pdf*). Reports should be uploaded to the appropriate lab section (B01, B02, or B03) of the course at UM Learn/Assessments/Dropbox Assignment Folders. There will be an individual folder for each lab report. Reports that are incorrectly named, formatted, or sent to the wrong lab section will not be accepted. Marked reports will be returned during a subsequent lab period.

Reports are due by 11:59 pm on the date indicated in the schedule.

Laboratory Schedule

Date	Lab	Topic	Lab report due	%
13-16 Sep	1	Dandelions		
20-23 Sep	2	Trees & Shrubs	Dandelions	4.1
27-30 Sep	3	Aquatic sampling I		
4-7 Oct		NO LAB		
12-14 Oct	4	Human Life Tables I (Introd.) & Competition I (set up)	Trees & Shrubs	4.1
18-21 Oct	5	Aquatic identification II		
25-28 Oct		NO LAB		
1-4 Nov	6	Human Life Tables II (data compilation and analysis)	Aquatic sampling	5.3
8-11 Nov		NO LAB		
15-18 Nov	7	Mark-Recapture	Human Life Tables	7.5
22-25 Nov	8	Competition II (harvest plants)	Mark-Recapture	7.5
29 Nov- 2 Dec	9	Films and Discussion – Ecology and Agriculture	Competition	7.5

Laboratory Report Format

Reports that do not follow the format and specifications outlined below will receive substantially less or no credit at all.

- Reports should be concise and to the point.
- **Each person should complete their own report** (*see section on Academic Integrity and resources therein for details on what constitutes plagiarism and its consequences*)
- Data will of course be the same for all group members, but absolutely no photocopying of tables, graphs or other information should be done
- *Text should be typed, double-spaced, using Times New Roman 12 size font; pages should be numbered.*
- Label sections (eg. Introduction, Results, etc.) clearly with a subheading.
- For more details about scientific writing, consult a style guide such as: **Day, RA.** 1998. How to write and publish a scientific paper, 5th edition, Oryx Press, Phoenix & New York (available as an e-book through the library).

Report length:

The **text portion** of the reports **should not exceed 4 pages**. The text portion of the report consists of the first 4 sections: ***Introduction, Material and Methods, Results, and Discussion.***

Gradual development of writing reports: In order to learn gradually how to write a scientific report, the initial reports will include only a subset of sections, progressively increasing until you write a complete report with all the sections. For those partial reports, each individual section of the text will have a page limit (further details provided in each lab handout).

1- Introduction (10 marks)

- usually short, often only a paragraph or two.
- puts the work about to be described into context, outlines the objectives, and sets the stage for the rest of the document.
- should include a little background information to illustrate why one would want to do this particular exercise and end with the specific objectives of the exercise.
- Should have at least one reference
- should not overlap with Materials and Methods.

2- Materials and Methods (10 marks)

- A recipe for what was done so that the experiment can be accurately replicated by someone else.
- For our reports it should be short. State when and where the exercise was performed. Briefly describe the procedure and refer to the handout for more information.
- Be sure to add in any additional details, special problems or changes to the procedure from that described in the handout. This would include any rules that were established (eg. edge rule, level of resolution, etc.).

3- Results (15 marks)

- Contains the **processed** data and a statement in words (called the **Summary**) of what was observed,
- There should be no discussion or interpretation of the data
- In the scientific literature, data is normally presented only once, in either tabular or graphical format. It is not considered acceptable to present the same data twice unless different information is extractable from each format. However, for these reports it may be useful to explore different ways of analyzing and presenting the data, and these may all be included in the final document.
- *Tables and Figures* (see section after References) must be referred to in the text of the summary at least once if they are to be included. This is done by bracketing the reference to a table (Table 1) or a figure (Figure 3) along with its sequential number within the text rather than repeating the entire title of the table or figure. This method is also used within the Discussion section.

- At a minimum, reports must include any analyses stipulated in the handout although the best lab reports will often carry the analysis further.

4- Discussion (30 marks)

- Interprets your results by describing some details of the data, the significance of the results, and its relationship to related studies described in the literature by utilizing at least three relevant references.
- Things to consider are:
 - What was learned (ecologically) from the exercise?
 - Were there any unexpected results?
 - Did you have any problems in applying the chosen method?
- Specific points to consider and include will be included in each handout.
- Do not simply include this as a series of answers to questions, but incorporate them as a cohesive discussion.
- And above all, be concise. Flowery language and lengthy discussions are not necessary in this type of format.

The text of all these four sections together should not exceed four pages. Any text that exceeds the four page limit will not be marked. For example, if your discussion is entirely in page five, you will not receive any credit for it.

After these four sections, there is no fix page limit for the next sections, but reports should be as concise as possible.

5- References (5 marks)

- Should contain the **complete** citation (names of author(s), year of publication, title, journal name, volume number, and first and last page numbers) for any work referred to in the report.
- The Introduction and Discussion of the report should incorporate a minimum of **three** recent references from the primary or secondary literature, relevant to the exercise. **At least one of these must be from a primary source.**
- The primary literature consists of research papers in peer-reviewed scientific journals describing original experimental work or observations.
- In the body of the report each reference should appear using the author's last name and year in brackets (author name, year) within the relevant sentence, and placed after the cited information.
- No reference may appear in the list unless it has been cited in the text, and all references cited in the text must appear in the reference list.
- A work may be cited and listed only if the student writing the report has actually seen and read that reference.
- See your textbook and its reference list as well as Day (1998) for further information about references.

6- Tables and Figures (20 marks)

- These are the central part of the results, but for convenience and publication requirements, they are located at the end of the report, after the references (although they must be mentioned in the *Results* section, see above).
- Each table or figure should be sequentially numbered and must have a descriptive caption which explains its content fully.
- Titles go below figures (a graph is a figure).
- By contrast, titles go above tables.
- Figures must have axes and any other details fully labelled.
- Tables must have all columns and rows fully labelled, including units of measurement. Computer generated tables and figures are to be encouraged, but be sure you adhere to the appropriate format.

7- **Appendix** (10 marks) includes any information supplementary to a report.

- You will be required to include the raw data you collected. This is simply the unprocessed data, entered neatly into properly labelled tables (including a table title and units).
- This does NOT mean the scrap of paper you used in the field stapled to the back of your report!
- If you don't include your raw data (unless it is not requested for that particular assignment) it may not be possible to check your results, and therefore you may not receive any marks for your report.
- You are also required to show at least one full set of sample calculations for each parameter calculated.

For general University and Faculty regulations and Resources for students please refer to **Schedule A: Student Resources and Support** available at the course UML site.
