Introduction

Complex interactions of many biotic and abiotic factors exist in natural plant communities. The lecture component of this course was designed to offer a theoretical understanding of these interactions. In this course broad descriptive, as well as specific quantitative approaches will be used to identify and understand the structural and functional attributes and functional mechanisms of plant communities. Dominant biotic interactions (plant-to-plant, plant-microbe interactions such as competition, symbiosis and allelopathy) and the role of environmental factors such as fire, microclimate and soil will be studied.

A general introduction will be given before each laboratory exercise followed by an outline of objectives and methods. While some of the exercises are original, a large part of this manual contains borrowed and modified versions of published texts, unpublished manuals and handouts. I would like to thank Robin Bloom and Eric Lamb for their help with an earlier revision of this manual. Lab manuals are always in need of changes and refinements as new knowledge comes to light. I welcome feedback from students and colleagues for its further improvement.

A.U.M

Course Outline of Biology 3114 (Plant Ecology)

Instructor: Dr. Azim Mallik

Complex interactions of many biotic and abiotic factors exist in natural plant communities. The lecture component of this course was designed to offer a theoretical understanding of these interactions. In this course broad descriptive, as well as specific quantitative approaches will be used to identify and understand the structural and functional attributes and functional mechanisms of plant communities. Dominant biotic interactions (plant-to-plant, plant-microbe interactions such as competition, symbiosis and allelopathy) and the role of environmental factors such as fire, microclimate and soil will be studied.

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The course will begin with a general introduction to plant ecology followed by more advanced treatments of selected topics on the subject. Theoretical concepts of ecosystem, plant community and plant community dynamics will be discussed. Special emphasis will be given to impacts of natural and human induced disturbances on the ecosystems. Lectures and presentation topics will cover the following:

1. Plant ecology and the ecosystem concept
2. Plant geography and vegetation description
3. Vegetation classification (descriptive)
4. Vegetation and site ordination (quantitative)
5. Vegetation and the concept of the community
6. Vegetation and the continuum concept
7. Disturbance and vegetation dynamics
8. Primary succession
9. Secondary succession (progressive and retrogressive)
10. Cyclical processes in vegetation dynamics
11. Vital attributes of species
12. Forest fire as a natural force in boreal ecosystems
13. Fire intensity, severity, frequency and post fire succession.
14. Allelopathy in natural and managed ecosystems: effects of fire suppression
15. Ecosystem management and Restoration ecology

RECCOMMENDED TEXT BOOK: Barbour, A.G., J.H. Burk, W.D. Pitts, F.S. Gilliam, and M.W. Schwartz (1999) Terrestrial Plant Ecology (3rd edition). Benjamin/Cummings Publishing Co. Inc., Don Mills, Ontario, p. 649.

OTHER REFERENCE TEXT BOOKS:

Gurvitch, J., Scheiner, S.M. and Fox, G.A. (2006) The Ecology of Plants (2nd edition). Sinauer Associates Inc., Publishers. Sunderland, Massachusetts, U.S.A. p. 574.

Aber, J.D. and Mellilo, J.M. (1991) Terrestrial Plant Ecology. Saunders College Publishing, Toronto, p.429.

Perry, D. A. (1994) Forest Ecosystems. John Hopkins University Press, Baltimore, p.649.

Brewer, R., (1988) The Science of Ecology. Saunders College Publishing, Toronto, p. 921.

Cherret, J.M. ed. (1989) Ecological Concepts. Blackwell Scientific Publications, p.385.

Many other textbooks and journal articles on plant ecology and general ecology are available in the Lakehead University Library. Students are strongly advised to consult additional sources for lab reports. There are also several excellent textbooks and many journal articles in my collection that you are welcomed to use.

Schedule for Plant Ecology Labs (Fall 2010)

Week	Date	Topic	Lab report due date
1	9/15/09	Intro to Lab and Lab Instructor	
2	9/18/09	Hawkeye Lake field trip (**all day Saturday)**	
2	9/22/09	Field trip to Mount McKay	
3	9/29/09	Succession lab	
4	10/06/09	Ordination Lecture	Succession lab (7%)
5	10/13/09	Ordination Lecture/PC-ORD	Quadrat size lab (3%)
6	10/20/09	Allelopathy intro. and experiment set up	
7	10/27/09	Allelopathy measurement & data analysis	Ordination lab (10%)
8	11/03/09	Presentations	
9	11/10/09	Presentations	
10	11/17/09	Presentations	Allelopathy lab (7%)
11	11/24/09	Lab Exam	

Distribution of Marks

A.	Theory (from lectures and labs)	
	1. Mid-term exam	10
	2. One class presentation and participation in discussions	10
	3. A three hour final exam (early December)	35
		55%
B.	Practical (laboratory and field work)	
	1. November - Examination	15
	2. Comprehensive Laboratory and Fieldwork Reports	30
		45%
	TOTAL	**100%**

Lab Report Preparation & Presentation Criteria and Evaluation

Laboratory projects will involve several outdoor field exercises surveying vegetation, collecting plant and soil data following transect and quadrat methods. Vegetation data will be analyzed using computer programs designed for this purpose. A total of 4 labs will be distributed over the term. Several of the exercises will require more than one lab period. Following the completion of selected exercises students will be required to submit a lab report on predetermined due dates. The due dates will be decided in the class as the work progresses. Both the qualitative (descriptive) and quantitative (analytical) techniques will be used in dealing with the ecological issues and problems. Formal lab reports should include an introduction, methodology, results, discussion and reference section.

The **introduction** should give background information and the purpose of the lab exercise; define terms used in the report and provide a site description. The **methods** section should describe the materials used and the steps taken to complete the lab exercise. The reader should be able to duplicate your experiment precisely by following the steps you have outlined. Equations for calculations should also be identified in this section. The **results** section should contain tables and figures appropriately labeled and a paragraph describing significant values or trends that you can identify. Raw data calculations should be included as an appendix for reference purposes. The **discussion** section should use the results to try to explain the trends represented. Use references to help support your ideas. The report should be organized so that the concepts and objectives are identified in the introduction; methods and results are described clearly followed by a discussion of the main results with the help of relevant literature as is done in a typical journal paper.

There is a detailed discussion of the appropriate format and tips for writing in Appendix III of the Lab Manual for this course.

Lab Report Evaluation Criteria (marks will be taken off for late assignments)

Organizational Format	1.0
Introduction	2.0
Methods	1.0
Results	2.0
Discussion	3.0
General Writing Quality	1.0
Total	**10 marks**

Reports will be marked out of ten and then weighted accordingly (see lab Manual)

General Marking Criteria for Lab Reports

Keep these questions in mind for each section of your report, as they will be the general criteria used to mark each lab assignment. Specific details of each assignment will however differ.

Introduction (/2) – Gives a background on the concept being studied. Introduction should include references to other similar studies pertaining to the concept. Purpose or objectives should be clearly outlined.

- Has the student made an effort to compare conflicting views, or follow the progression (over time) of ideas on the concept being studied?
- Is there a good understanding of the concept studied?
- Are the objectives clearly outlined?

Methods (/1) – Should outline where (site description) and how (data collection and data analysis) the study was carried out.

- Does the student list the study area, data collection, and data analysis methods correctly?

Results (/2) – This section presents the important findings of the study in the form of tables and figures. Any table or figure that has important information should be listed in this section and **not** listed in the appendix. The student should only focus on the **immediate results** in this section. Interpretation of results is what the discussion section is for. Any raw calculations should be listed in an appendix, following the discussion or conclusion section of the report.

- Are tables and diagrams used and labeled appropriately?
- Does the student avoid using discussion material in this section?

Discussion (/3) – This section should include interpretation of the results. Trends within your analysis should be recognized. Comparisons can be made between your findings and what other studies have shown (this is where a little literature review may be required). Objectives should be kept in mind when writing the discussion.

- Are trends within the results interpreted correctly?
- Does the student make reference to other similar studies and how they compared to their findings?
- Does the student answer the objectives set out in the introduction section?

Organizational Format (/1)

- Is the report well structured?
- Is there consistency within the report? e.g. headings & sub-headings formatted consistently
- Is literature cited correctly?
- Marks will be deducted as follows: 0.1 mark for each incorrect citation for a total of 0.5 marks; this includes reluctance to cite those results/ideas of other people. If there is blatant plagiarizing of peer reviewed or other student's work, a mark of 0 will be assigned for the paper.

General Writing Quality (/1)

- Is grammar acceptable? e.g. Are sentences written in proper tense?
- Are there any spelling mistakes? – Deductions: 0.1 mark for each mistake for a total of 0.3.
- Scientific names of organisms must be underlined or *italicized*! – Deductions: 0.1 mark for each mistake for a total of 0.3.

Literature Cited

Moore, R. 1992. Writing to Learn Biology. Saunders College Publishing, Orlando FL. 344 pp.

Pechenik, J.A. 1993. A Short Guide to Writing about Biology. Harper Collins, New York.

Rodman, L. 1996. Technical Communication. Harcourt Brace and Co. Canada.

Assessment of Seminar Presentation

Speaker: _____

Date: _____

Topic: _____

1. Organization of subject matter (logical order, interpretation, visual aids)

   1 2 3 4 5 6 7 8 9 10

Comments:

2. Research on the subject matter (depth of knowledge and relevant literature)

   1 2 3 4 5 6 7 8 9 10

Comments:

3. Presentation (enthusiasm, clarity, timing, mannerisms, grammar, speech attributes)

   1 2 3 4 5 6 7 8 9 10

Comments:

4. Discussion (interest aroused, ability to answer questions)

   1 2 3 4 5 6 7 8 9 10

Comments:

General Comments:

Evaluation by: _____