SEPTEMBER 2008 - WELCOME BACK
BIOLOGY 4090 4.0 - PLANT ECOLOGY

Lectures/Seminars Mondays, Wednesdays and Fridays 11:30-12:30, VH 1020
Labs Tuesdays 2:30-5:30 p.m. Lumbers 124, beginning Sept. 16

This course reflects the diversity of topics that make up the field of plant ecology: ecosystems, plant population ecology, physiological and evolutionary ecology, plant-herbivore interactions and applied ecology. Three lecture hours, three laboratory hours. One term. Four credits. Prerequisites: SC/BIOL 2010 4.00; SC/BIOL 2050 4.00.

Course Director:
Dr. Mark Vicari, 118A Farquharson, ext. 22445, mvicari@yorku.ca
Office Hours: By appointment; email is the best method of contact

Teaching Assistant:
Mr. Paul Chafe, pchafe@yorku.ca

Our text book:

We will also use electronic journal articles and articles available in the Steacie Library.

Marking Scheme
Research Essay 25%
Written critique of journal article 10%
Seminar based on critique 05%
Final exam (during exam period) 35%
Laboratory write-ups (2 labs) 15%
Seminar participation 10%
# Tentative Lecture Outline and Important Dates

Chapters refer to Silvertown & Charlesworth.

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>W 3 Sept</td>
<td>Introductory lecture</td>
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<tr>
<td>F 5 Sept</td>
<td>History of Ecology</td>
<td>PPT lecture 1</td>
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<tr>
<td>M 8 Sept</td>
<td>Succession and the ecosystem</td>
<td>PPT lecture 2 (+handout)</td>
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<td>W 10 Sept</td>
<td>Succession and the ecosystem</td>
<td>PPT lecture 3 (+handout)</td>
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<tr>
<td>F 12 Sept.</td>
<td>Discussion of succession</td>
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<tr>
<td>M 15 Sept</td>
<td>Nutrient cycling and feedbacks</td>
<td>PPT lecture 4 (+handout)</td>
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<tr>
<td>W 17 Sept</td>
<td>Nutrient cycling and feedbacks</td>
<td>PPT lecture 5 (+handout)</td>
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<tr>
<td>F 19 Sept.</td>
<td>Discussion of Nutrient cycling</td>
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<tr>
<td>M 22 Sept</td>
<td>Diversity and stability</td>
<td>PPT lecture 6 (+handout)</td>
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<tr>
<td>W 24 Sept</td>
<td>Diversity and stability</td>
<td>PPT lecture 7 (+handout)</td>
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<td>F 26 Sept.</td>
<td>Discussion of diversity and stability</td>
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<tr>
<td>M 29 Sept</td>
<td>Plant distribution, climate and life histories</td>
<td>PPT lecture 9 (+handout)</td>
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<tr>
<td>W 1 Oct</td>
<td>Rosh Hashanah - No Classes</td>
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<tr>
<td>F 3 Oct</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<tr>
<td>M 6 Oct</td>
<td>Plant population ecology: Introduction</td>
<td>PPT lecture 10 Chapter 1</td>
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<tr>
<td>W 8 Oct</td>
<td>Variation and inheritance</td>
<td>PPT lecture 11 Chapter 2</td>
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<td>F 10 Oct</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<tr>
<td>M 13 Oct</td>
<td>Thanksgiving - No Classes</td>
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<tr>
<td>W 15 Oct</td>
<td>Evolutionary and Ecological Genetics</td>
<td>PPT lecture 12 Chapter 3</td>
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<tr>
<td>F 17 Oct</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<tr>
<td>M 20 Oct</td>
<td>Evolutionary and Ecological Genetics</td>
<td>PPT lecture 13 Chapter 3</td>
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<td>W 22 Oct</td>
<td>Interactions: intraspecific competition</td>
<td>PPT lecture 14 Chapter 4</td>
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<tr>
<td>F 24 Oct</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<tr>
<td>M 27 Oct</td>
<td>Interactions: intraspecific competition</td>
<td>PPT lecture 15 Chapter 4</td>
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<tr>
<td>W 29 Oct</td>
<td>Population dynamics</td>
<td>PPT lecture 16 Chapter 5/6</td>
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<tr>
<td>F 31 Oct</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<tr>
<td>M 3 Nov</td>
<td>Population dynamics</td>
<td>PPT lecture 17 Chapter 5/6</td>
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<tr>
<td>W 5 Nov</td>
<td>Population dynamics: metapopulations</td>
<td>PPT lecture 18 Chapter 6/7</td>
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<td>F 7 Nov</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<td>M 10 Nov</td>
<td>Interactions: competition</td>
<td>PPT lecture 19 Chapter 8</td>
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<td>W 12 Nov</td>
<td>Competitions: competition</td>
<td>PPT lecture 20 Chapter 8</td>
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<td>F 14 Nov</td>
<td>Student presentations (2 per class)</td>
<td>see handout</td>
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<tr>
<td>M 17 Nov</td>
<td>Life histories</td>
<td>PPT lecture 21 Chapter 9/10</td>
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<tr>
<td>W 19 Nov</td>
<td>Interactions: predation and herbivory</td>
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<tr>
<td>F 21 Nov</td>
<td>Student presentations (2 per class)</td>
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<td>M 24 Nov</td>
<td>Interactions: predation and herbivory</td>
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<td>W 26 Nov</td>
<td>Interactions: mutualism</td>
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<td>F 29 Nov</td>
<td>Student presentations (2 per class)</td>
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<td>M 1 Dec</td>
<td>Student presentations (2 per class)</td>
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**Research Essay due**

M 27 Oct | Interactions: intraspecific competition | PPT lecture 15 Chapter 4 |

**Last day to drop fall term courses**

F 24 Oct | Student presentations (2 per class) | see handout |

**Final Lab Write-up due, Nov. 11**

W 12 Nov | Interactions: competition | PPT lecture 20 Chapter 8 |

**Competition lab write-up due, Nov. 11**

F 14 Nov | Student presentations (2 per class) | see handout |

M 17 Nov | Life histories | PPT lecture 21 Chapter 9/10 |

W 19 Nov | Interactions: predation and herbivory |                             |

F 21 Nov | Student presentations (2 per class) | see handout |

M 24 Nov | Interactions: predation and herbivory |                             |

W 26 Nov | Interactions: mutualism | PPT lecture 24 (+handout) |

F 29 Nov | Student presentations (2 per class) | see handout |

**Plant-herbivore lab write-up due, Dec. 2**
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<th>DATE</th>
<th>TOPIC</th>
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<tr>
<td>M 2 Feb</td>
<td>Dynamics of age-structured pop'ns</td>
<td>PPT lecture 21 Chapter 6</td>
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<tr>
<td>W 4 Feb</td>
<td>Interactions: competition</td>
<td>PPT lecture 22 Chapter 8</td>
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<tr>
<td>F 6 Feb</td>
<td><strong>Student presentations (2 per class)</strong></td>
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<tr>
<td>M 9 Feb</td>
<td><strong>Student presentations (2 per class)</strong></td>
<td><strong>COMPETITION lab write-up due, Feb. 10</strong></td>
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<td>W 11 Feb</td>
<td><strong>Student presentations (2 per class)</strong></td>
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<tr>
<td>F 13 Feb</td>
<td><strong>Student presentations (2 per class)</strong></td>
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<tr>
<td>M 16 Feb</td>
<td>No Class (Family Day)</td>
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<tr>
<td>W 18 Feb</td>
<td><strong>Student presentations (2 per class)</strong></td>
<td><strong>PLANT-HERBIVORE lab write-up due, Feb. 26</strong></td>
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Chapters refer to Silvertown & Charlesworth.
PLANT-HERBIVORE LAB – REVISED PROTOCOL

Tues. Feb. 3 2009

Microscopic examination of pseudostems

After you placed the pieces of grass into acidified alcohol, they were left for 48 hours. The acidified alcohol was replaced with lactophenol cotton blue stain.

1. Use gloves. Remove the pieces of stem from the vials with forceps. Carefully peel off the outer sheath with forceps. Lay flat on slide and cover with slip. (This is very fiddly.)

2. Look for inter-cellular hyphae, running parallel to the long axis of parenchyma cells.

Petri-plate grow-out: Check petri plates for fungal colonies.

Testing the toxicity of the endophyte

The endophyte produces various alkaloids, including ergovaline (an ergot alkaloid). We will have 2 groups of armyworms (Spodoptera frugiperda), one of which will be fed an uninfected diet, and the other will be fed an infected diet.

We will divide the class into three groups. Your instructors will set up the experiment (steps 1-3 in your lab manual) when the new armyworms arrive (Thurs. or Fri. of this week). On Fri. Feb. 6, the first group of students to sign up on the rota will come in to feed the armyworms. The instructors will feed the armyworms over the weekend. On Mon. Feb. 9, the second group will come in to feed the armyworms. The whole class will meet on Tues. Feb. 10. On Thurs. Feb. 12, the third group will come in to obtain dry weights of armyworms, grass and feces. These data will then be made available on the course website.

Feeders of armyworms

Friday Feb 6th – Group 1

Monday Feb. 9th – Group 2

Fri. Feb 6 AND Mon. Feb 9:

1. Feed the armyworms 2x the fresh mass of the heaviest armyworm, of either infected or uninfected grass. To obtain grass for feeding, cut a small amount of grass from plants onto damp paper towel and remove all dead bits. Weigh the grass for each armyworm to 0.1 mg and record on Sheet 2.

2. Weigh out a fresh grass sample of infected grass and place in an envelope with day 1, plate, weight, and initials of weigher recorded on envelope. Do the same for uninfected grass.
3. Place armyworms in incubator (set at 27°C 12L:12D).

4. Place envelopes of infected and uninfected grass in incubator. This is for determination of water content.

5. Each day, check for survival and whether an armyworm has molted. Do not continue feeding dead armyworms.

6. After feeding armyworms, record the fresh mass of the amount fed each armyworm on Record Sheet 2 in lab.

7. Place known fresh weights of infected and uninfected grass in envelope, properly labeled, inside drying oven, for water content determination.

**Tues. Feb. 10 2009 – whole class**

**End of armyworm experiment**

1. Take fresh weights of surviving armyworms – record on sheet 1. Place armyworms in the freezer. These will be transferred to a drying oven for weighing.

2. Separate uneaten grass from armyworm feces and place in drying oven.

3. Weigh envelopes of control samples of infected and uninfected grass.

4. Fill in data to Record Sheets 1 and 2.

Examine immunoblot card for infection. Red colour = endophyte infection; brown/pink = no infection

**Thurs. Feb 12 – group 3**

Students in this group should divide up the dried armyworms (~2 per person), weight them, dissect out the contents of the stomach, and re-weigh them. The mass of undigested material in the stomach can then be added to the mass of feces produced during the experiment. The dry weight of the armyworms should be recorded on sheet 1.

**Write-up for this lab is due Thurs. Feb. 19**
**Turnitin.com**
In this course, in addition to submitting a hard copy of your work, you will be asked to submit electronic copies of the two lab reports, your article critique, and the research essay to Turnitin.com. This will ensure that your hard work, having been added to the database, cannot be plagiarized in the future by students at any university!

To use Turnitin, you need to first register. York University has an excellent website on Turnitin with step-by-step instructions for registration:

http://www.yorku.ca/computing/students/turnitin.html

Step 4 in First Time Registration asks for the class I.D. number and enrolment password. They are:

Class I.D.: 2386127
Enrollment password: plant ecology

You may opt not to use Turnitin. If so, then you will be required to submit a rough copy of your assignment, rough notes, copies of the articles you cited with handwritten notes in the margins, dated printouts of web of science and bioabstract searches, etc.: in short, thorough documentation of your research.

**Website**
We will be using WebCT:

http://webct.yorku.ca/

If you have not used WebCT before, learn about it at:

http://www.yorku.ca/fsc/webct/student/quickstart.htm

**Activate your WebCT service**
To use WebCT to access your courses, you must first activate your WebCT service. This is a one-time only process; your WebCT service will be active until you deactivate it or leave York.

1. Go to CNS Web Applications page and click on Manage My Services.
2. Log in to Passport YORK as directed.
3. Once you’ve logged in, select Activate New Service, and then select WebCT from the list of your available services.
4. Follow the instructions to select your WebCT password.
5. To exit, click the Logout button in the upper right corner.

Your WebCT account will be active in approximately 30 minutes.
How to Write a Journal Critique.

1. Choose a journal article (or pair of articles) from the list below.
2. Read it.
3. Prepare a 5-page critique that briefly summarizes the questions/hypotheses/aims of the paper, along with the results. Also, assess the strengths and weaknesses of the paper - does it successfully answer (either positively or negatively) the questions raised. If the question could not be answered was this due to poor experimental design? You may need to read one or two other papers to gain more of a framework for assessing the importance of the paper (this is what is supposed to happen with peer-reviewed articles). Interestingly, you could also check, through web of science, what the citation history has been of your paper.
4. Hand it in, up to one week after your presentation of your critique.
5. Marking scheme (total value of assignment is 10%):
   - Introduction, framework, structure, spelling 20%
   - Content 25%
   - Criticism/assessment 50%
   - Citations and referencing 5%

Your Presentation

Your presentation slot to the class is 25 minutes long - this should include a 15-18 minute presentation and 7-10 minutes for discussion. Everyone should read your paper; participation marks depend on people joining in and asking questions!!
JOURNAL ARTICLES AVAILABLE FOR THE CRITIQUES/PRESENTATIONS


*will have a hard copy on reserve – not electronically available

# available for pdf downloads on the library website
SC/BIOL 4090: Plant Ecology
SUGGESTED RESEARCH ESSAY TOPICS
PLEASE SELECT ONE AND LET ME KNOW WHICH ONE YOU HAVE CHOSEN
If you have another, please discuss it with me first

You should have a reference list including at least 15 journal papers. Essays should be a maximum of 3,000 words (15 pages) of text - i.e. double-spaced typing. This does not include the reference list and tables or diagrams. Please try to type the paper, and print it out in a reasonable size font (i.e. not a tiny one to get more words per page!) The papers should be written in the style of a review. See Annual Review of Ecology and Systematics for examples. You should include an introduction and have sections in your paper. These are broad topics so you will have to decide how to best manage the huge amount of information.

Due date: Friday 24 October 2008

1. The role of gaps in forest regeneration
2. Stability and diversity: are more complex communities more stable?
3. The ecology of hemi-parasitic plants
4. Have plants and their pollinators truly co-evolved?
5. Life history strategies: what are the relative advantages of vegetative versus seed reproduction?
6. Evaluate the niche concept
7. How useful is the concept of r and K selection? or why is being an annual better than being a perennial?
8. The evolution of heavy metal tolerance in plants
9. Vegetation history of Canada since the Pleistocene
10. How does environment influence plant life history?
11. "Some plants benefit from being grazed"; true, false or somewhere in between?
12. Plant pathogens as agents of natural selection
13. "Many plants are best viewed as modular structures" - discuss
14. The ecology of salt marshes
15. Plant defenses: how quickly do they arise and how well do they work against herbivores?
   YOU could do either chemical or physical defenses
16. What are the ecological issues around genetically modified plants?
17. The role of endophytes as mediators of plant-animal interactions
18. Endophyte-plant interactions. Mutualism or parasitism?
19. Super Abundant species: What is the effect of double-crested cormorants on forest ecosystems.
20. Mycorrhizae as mediators of plant-herbivore interactions.
21. The role of mycorrhizae in plant competition.