BIOLOGY 334
STRUCTURE AND FUNCTION OF VASCULAR PLANTS

Lecture: 10:20-11:20 MWF; Laboratory: 2-5 M

Instructor: Roger Ruess, Irving 415B, 474-7153
Teaching Assistant: Dan Uliassi, Irving 102, 474-7006

Course Structure

This course is designed with three goals in mind:

1. To acquaint you with basic processes in plant physiological ecology, theory, and methodology.

2. To teach you to critically read and evaluate current biological literature.

3. To expose you to experimental design, experimental plant ecophysiology, analyzing and interpreting the results from experiments, and writing a research paper.

The course consists of a combination of lectures, labs and discussions of journal articles. Lectures will be given on Mondays and Wednesdays. Fridays will be reserved for student-led discussion section.

Grading

Your grade will be calculated as follows:

Weekly summaries  20%
Discussion leader  15%
Quizzes            20%
Term paper         40%
Participation      5%

Discussions

Learning to read scientific papers critically in an area of research unfamiliar to you takes practice. Each week you will be asked to read one journal article assigned by the instructor. Articles will be available one week prior to lecture and copies will be held on reserve Room 211 Irving. To acquaint you with the process, the first discussion will be led by the instructor or TA. After that, each student will present one paper. You will be graded on your understanding of the paper, ability to present and explain it to others, and ability to elicit and guide discussion from group members.
Weekly summaries

To prepare for discussion, each student will be required to hand in:

* A page, headed by the reference, in a format following that of the particular article.

* A list of 3 brief points about the paper that you found interesting.

* Three questions you have about the paper. These can include problems you see with the paper, questions about the methodology, or areas you didn't understand.

Quizzes

There are no exams given in this course. There will be a very short quiz at the beginning of class every other Friday. Quizzes will be based on the text readings and lecture materials from the previous 2 weeks, and will consist of 10 short questions. If you have attended and payed attention in class, and read the assigned text readings, you should have no problems answering the questions.

Term Paper

Lab periods in September and October will be devoted to working on a group research project. The details of this project will be outlined during the first lab session. Three lab periods in November will be devoted to analysis and interpretation of data. The results from your experiments will be written up individually. The format of the paper will follow that if a major scientific journal; specifics are to follow later in the semester. You will submit a rough draft of the paper on Wednesday, Nov. 29. It will be returned with comments by the following Wednesday, and the final draft will be due on Wednesday, Dec. 6.

The 40% of your grade determined by this term paper is divided as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental work</td>
<td>10%</td>
</tr>
<tr>
<td>Analysis</td>
<td>5%</td>
</tr>
<tr>
<td>Rough draft</td>
<td>10%</td>
</tr>
<tr>
<td>Final draft</td>
<td>15%</td>
</tr>
</tbody>
</table>
### COURSE OUTLINE

#### I. Radiation and Temperature: Energy, Information, Stress

1. 11 Sept  The Radiation Environment
2. 13 Sept  Effects of Spectral Distribution on Plants
3. 18 Sept  Effects of Irradiance on Plants

#### II. Carbon Utilization and Dry Matter Production

4. 20 Sept  Photosynthesis, Photorespiration and C0₂ Exchange
5. 25 Sept  
6. 27 Sept  
7. 2 Oct  Plant Carbon Budgets, Carbon Allocation and Growth
8. 4 Oct  
9. 9 Oct  
10. 11 Oct  
11. 16 Oct  Stable Isotopes and Plant Ecophysiology
12. 18 Oct  

#### III. Plant Mineral Nutrition

11. 23 Oct  Nutrients in the Soil System
12. 25 Oct  Physiology of Plant Nutrient Uptake
13. 30 Oct  Plant Morphological Responses
14. 1 Nov  Mycorrhizae
15. 6 Nov  
16. 8 Nov  Patterns of Response to Soil Fertility

#### IV. Plant Water Relations

17. 13 Nov  Water Relations of Plants and Soils
18. 15 Nov  
19. 20 Nov  
20. 22 Nov  

#### V. Responses of Plants to Environmental Stress

21. 27 Nov  Temperature

#### VI. Plant Response to Herbivory

25. 29 Nov  
26. 4 Dec  
27. 6 Dec