BIOLOGY 334
STRUCTURE AND FUNCTION OF VASCULAR PLANTS
Lecture: 9:15-10:15 MW; Laboratory: 2-5 M or W; Discussion: 9:15-10:15 F

Instructor: Roger Ruess (ffwr@uaf.alaska.edu), Irving 415B, 474-7153
Teaching Assistant: Marta Mueller (fmrm@uaf.alaska.edu), Irving 213, 474-6677

Course Structure
The course consists of a combination of lectures, discussions of journal articles, and a semester-long laboratory experiment. Lectures will be given on Mondays and Wednesdays. Fridays will be reserved for a student-led discussion journal articles. The 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.

Grading
Your grade will be calculated as follows:

Lecture:
  Quizzes 25%

Discussions:
  Weekly summaries of papers 15%
  Participation in discussions 5%
  Discussion leader 15%

Laboratory:
  Final paper 40%

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. Copies of articles can be picked up in Room 211 Irving on Mondays. To acquaint you with the process, the first discussion will be led by the instructor. After that, a pair of students will present one paper. You will be graded on your understanding of the paper, ability to present and explain it to others, ability to elicit and guide discussion from group members, and participation.
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.

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. 25. It will be returned with comments by the following Wednesday, and the final draft will be due on Wednesday, Dec. 9.

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

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

I. Radiation and Temperature: Energy, Information, Stress

1. 9 Sept  The Radiation Environment
2. 14 Sept  Effects of Spectral Distribution on Plants
3. 16 Sept  Effects of Irradiance on Plants

II. Carbon Utilization and Dry Matter Production

4. 21 Sept  Photosynthesis, Photorespiration, and CO₂ Exchange
5. 23 Sept  " "
6. 28 Sept  " "
7. 30 Sept  Respiration
8. 5 Oct  Plant Carbon Budgets, Carbon Allocation and Growth
9. 7 Oct  " "
10. 12 Oct  " "
11. 14 Oct  Stable Isotopes in Plant Ecophysiology
12. 19 Oct  " "

III. Plant Mineral Nutrition

13. 21 Oct  Nutrients in the Soil System
14. 26 Oct  Plant Nutrient Uptake
15. 28 Oct  Mycorrhizae
16. 2 Nov  " "
17. 4 Nov  Plant Response to Soil Fertility: N&P
18. 9 Nov  " "

IV. Plant Water Relations

19. 11 Nov  Water Relations of Soils and Plants
20. 16 Nov  " "
21. 18 Nov  " "
22. 23 Nov  " "

V. Responses of Plants to Environmental Stress

23. 25 Nov  Temperature
24. 30 Nov  Plant Growth Regulators

VI. Plant Response to Herbivory

25. 2 Dec
26. 7 Dec