HORT 476/576: ENVIRONMENTAL PLANT STRESS PHYSIOLOGY
Spring 2013

Credits: 3 credits 476; or 4 credits 576

Class Schedule: HORT476/576 - 9:30 – 10:45 a.m. Tu/Th, Rm 102 Shepardson
HORT576 – 3:30 – 4:20 p.m. Th, Rm 120 Shepardson

Instructors: Dr. Bill Bauerle, 213 Shepardson Building
Office phone: 491-4088
Email: bauerle@colostate.edu
Office hours: 1:00-3:00 PM Tuesday and by appointment

Brianna Miles, 213 Shepardson Building
Email: blmiles@rams.colostate.edu
Office hours: 1:00-3:00 PM Thursday and by appointment

Assistant Instructors: Dave Barnard, Grace Lloyd and Gretchen Reuning

Prerequisites: BZ 440 Plant Physiology, or permission of instructor

Attendance Policy: Participation is a key component of success in the class. You are expected to attend every lecture unless classes have been officially cancelled by the University. If you miss a class, you are responsible for the material covered during that class. If the professor is more than 15 minutes late for class, the class is considered cancelled and the students may leave.

Academic Integrity and the Honor Pledge:
This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog - 1.6, pages 7-9. [http://www.catalog.colostate.edu/Content/files/2012/FrontPDF/1.6POLICIES.pdf](http://www.catalog.colostate.edu/Content/files/2012/FrontPDF/1.6POLICIES.pdf) and the Student Conduct Code ([http://www.conflictresolution.colostate.edu/conduct-code](http://www.conflictresolution.colostate.edu/conduct-code)). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.
It is our expectation that you will honor the following statement throughout this course:
I pledge on my honor that I have not received or given any unauthorized assistance on this academic work.

Textbooks: There is no required textbook for this course. Recommended reading: Taiz and Zeiger, Plant Physiology, 5th edition

RamCT Blackboard: All lecture notes and readings will be posted on and accessed via Blackboard. Other helpful information and communications for the course will also be found on Blackboard. No assignments, quizzes or tests will be conducted on Blackboard. [https://ramct.colostate.edu/](https://ramct.colostate.edu/)
**STUDY HELP:** For questions about the material, please contact the instructors by email, stop by during office hours, or make an appointment. Questions are welcomed during or after class as time allows. For those without the prerequisite Plant Physiology: be prepared to study a lot. Keep up with background reading and studying, and ask for help before it is too late.

**Course Objectives:**
The successful completion of the course implies the student will have the following knowledge by the end of the semester:
1) Understand the important aspects of plant growth, development and physiology
2) Understand and be able to identify and describe the major sources of stress in plants
3) Students will examine plant responses to stress at multiple levels of integration - from the molecule to the whole plant
4) Students will examine global issues related to environment and plant stresses
5) Students will review and use the primary scientific literature as a basis for the in-depth study of plant responses to environmental stress
6) Students will develop critical thinking and problem-solving skills through class discussions

**Differentiation between 476 and 576:**
HORT 476 is a 3 credit class for upper level undergraduates. It is designed as a primary elective in the area of plant physiology. The requirements for HORT 476 follow the general aspects of other undergraduate classes (lectures and scheduled exams). HORT 576, on the other hand, is designed for graduate students and therefore, expectations are elevated above that of HORT 476 lecture. Graduate students are required to participate an extra hour per week in a critical thinking discussion session of current literature in the field and therefore, HORT 576 has an additional credit (a 4 credit class). The extra hour session of HORT 576 requires reading and analyses preparation outside of the scheduled HORT 476 and HORT 576 meeting times.

**Exams and Grading Policy:**
There will be three in-class exams during the semester and one final exam. I will not accept any excuses for missing a scheduled exam (sorry but the prior class ruined this for everyone). In-class exams will include material from both lectures and readings. They will consist of both short-answer questions and 1-2 paragraph essay questions. The final exam will be cumulative and will consist of a number of longer essay questions that integrate the knowledge presented in class. Final grades will be calculated as follows:

- 3 in-class exams 300 pts (100 each)
- Discussion leadership and participation (576 only) 100 pts
- Final exam 100 pts

Final Grade 476 = (Total points earned/400) x 100
Final Grade 576 = (Total points earned/500) x 100

Grading Scale: The grading scale is conventional: 90-100%: A; 80-89%: B; 70-79%: C; 60-69%: D; < 60%: F.
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<thead>
<tr>
<th>Lecture</th>
<th>Date</th>
<th>Lecture/Discussion Topic</th>
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<tbody>
<tr>
<td>L1</td>
<td>1/22</td>
<td>Course introduction and assigned readings + Overview of environmental stresses</td>
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<tr>
<td>L2</td>
<td>1/24</td>
<td>Basics of physiological processes and their response to environmental conditions</td>
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<td>L3</td>
<td>1/29</td>
<td>Global climatic change; air pollution and anthropogenic effects on plants</td>
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<td>L4</td>
<td>1/31</td>
<td>Impact of weather on plant energy balance</td>
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<td>L5</td>
<td>2/5</td>
<td>Energy budgets, evaporation, and transpiration</td>
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<td>L6</td>
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<td>High light stress</td>
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<td>L7</td>
<td>2/12</td>
<td>High light stress continued</td>
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<td>L8</td>
<td>2/14</td>
<td>High temperature stress, climate warming</td>
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<td>L9</td>
<td>2/19</td>
<td>High temperature stress continued</td>
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<td>E1</td>
<td>2/21</td>
<td>Exam 1</td>
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<tr>
<td>L10</td>
<td>2/26</td>
<td>Review of water relations</td>
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<td>L11</td>
<td>2/28</td>
<td>Water-use efficiency and isotopes</td>
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<td>L12</td>
<td>3/5</td>
<td>Drought stress; flooding and anoxia; anatomy; stress quantification</td>
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<td>L13</td>
<td>3/7</td>
<td>Mineral nutrient uptake, soil pH, acidic and alkaline soils, tolerance</td>
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<tr>
<td>L14</td>
<td>3/12</td>
<td>Mineral nutrient use efficiency and measurement</td>
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<td>E2</td>
<td>3/14</td>
<td>Exam 2</td>
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<td>3/18-3/24</td>
<td>Spring Break</td>
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Chilling stress, dormancy and acclimation – e.g. growing degree days, anatomical adjustments, winter injury

Transfer processes within and above plant canopies – wind and conductance

Measuring gas exchange across scales

Plant stress models

Plant stress models continued

Quantitative genetics & plant physiological models

Exam 3

Scaling fluxes (parameters and parameter stress response) - leaf to globe

Scaling fluxes (modeling) - leaf to globe

Respiration and carbon balance

Plant-plant interactions

Overview of recent advances in stress measurement and detection

Future developments; State of knowledge: what we know, and what we don’t know

Final exam review and class improvement discussion

Final Exam (TBA)

*The schedule and assignments above are subject to change.*