
Morphology, anatomy, and physiology of vascular plants, stressing the interrelationships between development, growth, water relations, photosynthesis, transport, and metabolism. 4 credits (3 + 3). Prerequisites: Biol. 239, Engl. F111X, and Engl. F211X or Engl. F213X or permission of instructor.

Lectures: MWF 10:30-11:30 am, AHRB 183
Lab: M 2:15-5:15 pm, IRV 207

Instructor: Dr. Syndonia Bret-Harte – ffmsb@uaf.edu
Office: T-6 (East end of AHRB), NW corner
Mailbox: 311 Irving
Office hours: W 11:30 – 1 pm or by appointment
Phone: 5434

Teaching Assistant: Christian Richey – ftcbr@uaf.edu
Office: 214 WRRB
Office hours: to be determined & by appointment
Phone: 1175


The textbook publisher maintains on-line learning resources at http://www.plantphys.net/. Some course materials, including this syllabus and lecture outlines, will be posted online on Blackboard.

Grading

1. Points will be awarded for performance on lecture and laboratory exercises.
2. Grades will be based on percentage of total possible points according to the scale:
   - A 90-100%
   - B 80-89%
   - C 70-79%
   - D 60-69%
   - F 0-60%

3. Lecture and laboratory exercises:

<table>
<thead>
<tr>
<th>Points</th>
<th>Activity</th>
<th>Date due</th>
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<tbody>
<tr>
<td>200</td>
<td>Two mid-term exams, one hour each</td>
<td>Feb 20, Apr 6</td>
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<td>200</td>
<td>Final exam, two hours</td>
<td>May 6</td>
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<tr>
<td>225</td>
<td>Nine problem sets</td>
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<tr>
<td>150</td>
<td>Short lab reports, lab notebook, &amp; miscellaneous</td>
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<td>assignments</td>
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<td>25</td>
<td>Proposal for independent lab project</td>
<td>Feb 27</td>
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<tr>
<td>50</td>
<td>Draft of Introduction &amp; Methods</td>
<td>Apr 10</td>
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<tr>
<td>50</td>
<td>Draft of Results &amp; Discussion</td>
<td>Apr 22</td>
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<tr>
<td>100</td>
<td>Final Lab Report</td>
<td>May 4</td>
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A significant part of each exam will involve written essays. Due dates and the course schedule may change. If so, an announcement will be made in class.

4. If you are going to miss an exam, it is essential that you contact Dr. Bret-Harte as soon as possible to discuss the reasons. Unexcused absences from exams will be recorded as a zero.

5. If you are going to miss lab, you must contact Mr. Richey as soon as possible to make arrangements for making up the exercises you will miss. You are responsible for mastering the material and completing assignments from a missed lab. Unexcused absences from lab will be recorded as a zero.

6. Late assignments and problem sets will lose 10% for each day that they are late, unless an arrangement is made with Dr. Bret-Harte in advance.

7. Academic Integrity – the UAF Student Code of Conduct is presented on page 83 of the 2008-2009 Course Catalog. No collaboration among students is allowed on exams or quizzes, and although students may work together in collecting, analyzing, and interpreting data, no collaboration is permitted in writing of lab reports, lab assignments, or problem sets. Copying or paraphrasing another student’s writing is a violation of the Code of Conduct. Violations of the Code of Conduct may result in an F for the course and/or suspension or expulsion from the University.

8. The Office of Disability Services implements the Americans with Disabilities Act (ADA) and ensures that UAF students have equal access to the campus and course materials. I will work with the Office of Disability Services (208 Whittaker) to provide reasonable accommodation to students with disabilities. Please come talk to me if you need help or special accommodations of any kind.

Course goals and student learning outcomes: The overall goal of this course is to provide an understanding of how plants function as whole organisms, and the relationships between their structure, function, and the environments in which they live. At the end of the course, I hope that students will understand how plants are intimately connected to their environments and how they function in an integrated way. I hope that students will achieve mastery of the concepts presented in the course and will improve their abilities to formulate hypotheses and write scientific reports.

**Course Schedule (subject to change)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Activity</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 23</td>
<td>F</td>
<td>Introduction: overview of plant structure and overall plant growth</td>
<td>ch. 1</td>
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<td></td>
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<td>Lab 1: Seed separation for spruce germination project</td>
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<tr>
<td>26</td>
<td>M</td>
<td>Photosynthetic energy capture</td>
<td>ch. 7</td>
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<td>28</td>
<td>W</td>
<td>Physiology of photosynthesis I</td>
<td>ch. 7, 8</td>
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<td>30</td>
<td>F</td>
<td>Discussion: <em>overall growth problem set</em></td>
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<tr>
<td>Feb 2</td>
<td>M</td>
<td>Physiology of photosynthesis II</td>
<td>ch. 8</td>
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<td>Lab 2: growth analysis</td>
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<tr>
<td>4</td>
<td>W</td>
<td>Photosynthetic gas exchange I</td>
<td>ch. 9</td>
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<td><em>Overall growth problem set due</em></td>
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<tr>
<td>6</td>
<td>F</td>
<td>Discussion: <em>photosynthesis problem set</em></td>
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<tr>
<td>9</td>
<td>M</td>
<td>Photosynthetic gas exchange II: water cost of photosynthesis</td>
<td>ch. 9</td>
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<td>Lab 3: Photosynthetic gas exchange</td>
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<tr>
<td>11</td>
<td>W</td>
<td>Environmental dependence of transpiration</td>
<td>ch. 4</td>
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<td><em>Photosynthesis problem set due</em></td>
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13 F Discussion: leaf function problem set

16 M Leaf energy balance and temperature
Lab 4: Photosynthetic gas exchange & pigment extraction

18 W Stomatal control and responses
Leaf function problem set due

20 F Mid-term exam I

23 M Water potential, cell osmotic relations
Lab 5: Water potential & individual project development

25 W Water transport I

27 F Discussion: water potential problem set
Project Proposal due

Mar 2 M Water transport II
Lab 6: Plant anatomy I

4 W Water uptake by roots
Water potential problem set due

6 F Discussion: water transport problem set

9-13 Spring break

16 M Photosynthate translocation
Lab 7: Plant anatomy II

18 W Mineral nutrition
Water transport problem set due

20 F Discussion: translocation problem set

23 M Cell ion relations
Lab 8: mineral deficiency experiment set-up

25 W Ion transport: trans-membrane & trans-root
Translocation problem set due

27 F Discussion: ion transport problem set

30 M Plant respiration
Lab 9: Growth responses to environmental cues – light & gravity (+ spruce seeds to growth chamber)

Apr 1 W Respiratory costs of growth & maintenance
Respiration problem set due

3 F Discussion: respiration problem set

6 M Mid-term exam II
Lab 10: Individual projects, record spruce seed germination

8 W Growth of plant cells
Respiration problem set due

10 F Discussion: growth problem set
Draft of Introduction and Methods due

13 M Plant hormone classes and actions
Lab 11: Growth responses to hormones, individual projects

15 W Plant hormones II
Growth problem set due

17 F Growth correlation mechanisms & stress physiology
20 M  Growth & development: embryogenesis & control of polarity  ch. 16
   Lab 12: Data analysis for individual projects
22 W  Light responses  ch. 17,18,25
   Draft of Results and Discussion due
24 F  no class
27 M  Gravitropism, photoperiodism  ch. 19, 25
   Lab 13: Data analysis for individual projects
29 W  Dormancy, freeze-tolerance  ch. 23, 26
May 1 F  Turgor movements: tactic & seismic responses  ch. 17
  4 M  Review
     Lab 14: Presentations of individual projects
     Final lab project report due at the beginning of Lab
  6 W  Final exam, 10:15-12:15

Specific pages and/or additional readings will be assigned in class.