

**Plant Biology for Teachers**  
BIOC 655  
Online Fall 2009

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**Learning Objectives**

In this class, you will:

1. Explain the unique features of plant cells and plant-based macromolecules.
2. Describe basic plant anatomy and morphology with an emphasis on angiosperms.
3. Understand important plant growth and development processes including the production and influence of plant hormones.
4. Explain plant reproduction and the alternation of generations.
5. Understand the fundamental biochemical pathways of photosynthesis and cellular respiration.
6. Explain inheritance of traits using angiosperms as model systems.
7. Distinguish between characteristics of members of the Kingdom Plantae including Bryophytes, Ferns, Gymnosperms, and Angiosperms; understand plant classification.
8. Summarize and interpret plant biology information research articles and popular media.
9. Learn techniques for transferring plant biology content to students grades 5-12.

**Course Resources**

- You will need a copy of the book *Introductory Plant Biology* 9<sup>th</sup> edition by Kingsley R. Stern (ISBN: 0073101753). You can purchase it new or used at the bookstore or website of your choice.
- The course web site will contain files with most course readings or links to required web sites, as well as supplemental materials and PowerPoint files for course presentations. Additional resources are available on Ereserves.

**Navigating the Course:**

The course website is accessible to all enrolled students at [www.uofaonline.net](http://www.uofaonline.net). Click on the “Academics PSH” tab to see the list of courses for which you have access.

This course is organized into modules. Except for module 1, each module will be “open” for two weeks. Each module will become available on Monday morning, and **ALL the activities for each module must be turned in by the Tuesday morning two weeks following at 6 am MST.**

This is known as a “guided” online course, and the course provides a structure so that you will (hopefully) not get far behind. Everyone enrolled in the course will be in the same unit at the same time, so that we can engage in discussions of the material in the unit.

Each module will consist of the following sections, which are designed to be completed in order:

- **Overview**
- **Reading Assignment(s)**

- **Lesson** (includes lecture material)
- **Review:** including central themes and terminology.
- **Discussion:** We will give you a topic from the week's reading and/or lecture, and you will post your comments and questions about the material and respond to the comments and questions of other participants. Discussions will focus on methods for presenting course content to students in grades 5-12.
- **Activity:** Focusing on creative techniques for conveying this material to students in grades 5-12.
- **Unit Assignment**
- **Plant Biology News Discussion**
- **Reflections**
- **Unit quiz**

You will also be required to complete one **Webliography assignment**. A webliography is “an enumerative list of hypertext links and a gateway to the scientific sources of information on the Net”. You will create a list of ten annotated sources [organized in APA format] that include information and materials for teaching plant biology lessons. These can consist of lab activities, worksheets, puzzles, videos, or any other teaching materials available on the web. In addition to the citation, please include the following information for each entry:

1. The plant biology topic for which this source would be useful and why.
2. Would this information or activity be used as an introduction to the topic, a summary, etc?
3. How would you modify the materials for improvement, to accommodate your audience, or to accommodate the lab space and resources available to you?

## Weekly Syllabus

Unit	Topic/Activities
<b>Unit One:</b>	<b>Introduction to Online Learning</b>
	<ul style="list-style-type: none"> <li><input type="checkbox"/> eCollege student orientation tutorial</li> <li><input type="checkbox"/> <b>Discussion:</b> Introduce yourself.</li> <li><input type="checkbox"/> <b>Assignment 1:</b> Using the online course tools.</li> <li><input type="checkbox"/> <b>Assignment 2:</b> Plant Biology Pretest.</li> <li><input type="checkbox"/> <b>Quiz:</b> Self Assessment Quiz #1</li> </ul>
<b>Unit Two:</b>	<b>Plant Macromolecules, Cells, and Tissues</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 2, 3, 4.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Chemical basis of life focusing on plant-specific macromolecules.</li> <li><input type="checkbox"/> Eukaryotic cell structures - particularly those unique to plants.</li> <li><input type="checkbox"/> Meristematic and non-meristematic tissues: locations and characteristics.</li> <li><input type="checkbox"/> <b>Teaching</b> secondary students an understanding of building complexity in living organisms.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> <li><input type="checkbox"/> <b>News Discussion</b></li> </ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz:</b> Self Assessment Quiz #2</li> </ul>
<b>Unit Three:</b>	<b>Angiosperms: Plant Anatomy and Morphology</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 5, 6, 7.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> What are the functions of the major plant organs – roots, stems, and leaves?</li> <li><input type="checkbox"/> How are these organs modified to allow for special functions?</li> <li><input type="checkbox"/> Describe internal and external characteristics of these organs.</li> <li><input type="checkbox"/> The differences between monocots and dicots.</li> <li><input type="checkbox"/> <b>Teaching</b> secondary students how form relates to function.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> <li><input type="checkbox"/> <b>News Discussion</b></li> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz:</b> Self Assessment Quiz #3</li> </ul>
<b>Unit Four:</b>	<b>Plant Growth and Development, and Fluid Transport Systems</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 9 and 11.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Investigate the nature of water.</li> <li><input type="checkbox"/> Transpiration and the regulation of water movement throughout a plant.</li> <li><input type="checkbox"/> How does fluid move through the phloem?</li> <li><input type="checkbox"/> Hormones and the regulation of plant growth and development.</li> <li><input type="checkbox"/> Plant movements, photoperiodism and phytochrome: regulation of growth and timing.</li> <li><input type="checkbox"/> <b>Teaching</b> secondary students an understanding of how plants, as living organisms, adapt to their environment.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> <li><input type="checkbox"/> <b>News Discussion</b></li> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz:</b> Self Assessment Quiz #4</li> </ul>
<b>Unit Five:</b>	<b>Plant Reproduction and the Alternation of Generations</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 8 and 12.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Two distinct organisms: the alternation of generations.</li> <li><input type="checkbox"/> Dominant generations throughout the plant kingdom.</li> <li><input type="checkbox"/> Flower structure and function.</li> <li><input type="checkbox"/> Pollination, fertilization, and germination.</li> <li><input type="checkbox"/> Development and structure of seeds and fruits.</li> <li><input type="checkbox"/> <b>Teaching</b> secondary students an understanding of the life cycle as a continuous process.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> </ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> <b>News Discussion</b></li> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz: Self Assessment Quiz #5</b></li> </ul>
<b>Unit 6:</b>	<b>Energy Transfer: Photosynthesis and Cellular Respiration</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 10.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Purpose of photosynthesis and cellular respiration.</li> <li><input type="checkbox"/> Steps of photosynthesis - reactants and products.</li> <li><input type="checkbox"/> The light-dependent and light-independent reactions of photosynthesis.</li> <li><input type="checkbox"/> Steps of cellular respiration - reactants and products.</li> <li><input type="checkbox"/> The physiology and adaptations of C<sub>3</sub>, C<sub>4</sub>, and CAM plants.</li> <li><input type="checkbox"/> <b>Teaching:</b> Making complex biochemical pathways understandable to secondary students.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> <li><input type="checkbox"/> <b>Genetics News Discussion</b></li> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz: Self Assessment Quiz #6</b></li> </ul>
<b>Unit 7:</b>	<b>Genetics, Biotechnology, and Propagation</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 13 and 14.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Review nucleic acid structure and function.</li> <li><input type="checkbox"/> The application of Mendelian genetics applies in plants.</li> <li><input type="checkbox"/> Tissue culture and its applications.</li> <li><input type="checkbox"/> Biotechnology and Agriculture: Edible vaccines and “golden” rice.</li> <li><input type="checkbox"/> <b>Teaching</b> secondary students how applications of science can improve our lives.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz: Self Assessment Quiz #7</b></li> </ul>
<b>Unit 8:</b>	<b>Plant Evolution and Classification: A survey of the plant kingdom</b>
	<p><b>Reading:</b> <i>Introductory Plant Biology</i> 9<sup>th</sup> edition by Stern: Chapter 15 and 16.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evolution and biological diversity.</li> <li><input type="checkbox"/> Mechanisms of Evolution – Natural Selection.</li> <li><input type="checkbox"/> Linnaeus and the Binomial System of Nomenclature.</li> <li><input type="checkbox"/> Classification of major plant groups.</li> <li><input type="checkbox"/> Cladistics and the natural relationships of organisms.</li> <li><input type="checkbox"/> <b>Teaching</b> secondary students the concept of the interrelatedness of life based on science.</li> <li><input type="checkbox"/> <b>Discussion:</b></li> <li><input type="checkbox"/> <b>Activity:</b></li> <li><input type="checkbox"/> <b>Assignment:</b></li> <li><input type="checkbox"/> <b>Genetics News Discussion</b></li> <li><input type="checkbox"/> <b>Reflections</b></li> <li><input type="checkbox"/> <b>Quiz: Self Assessment Quiz #8</b></li> </ul>

**Grading: Total points 800**

**Unit 1 Introduction to Online Learning (20 points total)**

<b>Discussion:</b> Introduce yourself:	5 points
<b>Assignment 1:</b> Using the online course tools:	5 points
<b>Assignment 2:</b> Plant Biology Pretest:	5 points
<b>Quiz:</b> Self Assessment Quiz #1:	5 points

**Units 2-8 Course Content (100 points each = 700 points total)**

<b>Discussion:</b> Original post	5 points
Responses to posts (2)	6 points
<b>Unit Assignment</b>	25 points
<b>Plant Biology News Discussion</b>	
Original post	3 points
Responses to posts (1)	3 points
<b>Reflections</b>	8 points
<b>Unit quiz</b>	50 points
<b>Webliography</b>	80 points

**Grades** will be assigned as follows: A, 90-100%; B, 80-89%; C, 70-79%, D, 60-69%, E, below 60%.

**Discussion and Assignment Policies:**

As there is no “face time,” online courses depend on interactions among the class participants and instructors through asynchronous discussion threads and between the instructors and the student through the completion of assignments. **Therefore, it is critical that you actively participate in all discussions and turn in assignments on time.**

Discussion will be graded mostly on participation, but the depth of your comments will also be taken into account. All questions posed for the discussion need to be addressed. Responses should have more depth than “I agree.” Where appropriate, please bring in relevant examples from your experiences in the classroom or your work on the assignments.

**No late assignments will be accepted, and no Incomplete grades will be given. In return, we pledge to get you feedback on written assignments and discussions promptly so that you will know where you stand.**

**Disability Resources:** If you anticipate issues related to the format or requirements of the course, please contact us. We would like us to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Resources (520-621-3268; <http://drc.arizona.edu>) and notify us of your eligibility for reasonable accommodations. We can then work with you and the DRC staff to coordinate your accommodations.

**Academic Integrity:** Violations of scholastic ethics are considered serious offenses by the University of Arizona, the General Biology Program, and by your instructors. All work done for this class must be your own. You may collaborate with your colleagues on class activities and projects, but your performance on all graded work should be your own, unless you are specifically turning in a group project.. Any ideas “borrowed” from others should be plainly

represented as such. Any form of cheating or plagiarism will be dealt with severely and may result in a grade of “E” for the course. For more information on the University of Arizona’s academic integrity policies, please see: <http://studpubs.web.arizona.edu/policies/cacaint.htm>

**Creating a constructive class environment:** *Threatening behavior is prohibited.* “Threatening behavior” means any statement, communication, conduct or gesture, including those in written form, directed toward any member of the University community that causes a reasonable apprehension of physical or emotional harm to a person or property. A student can be guilty of threatening behavior even if the person who is the object of the threat does not observe or receive it, so long as a reasonable person would interpret the maker’s statement, communication, conduct or gesture as a serious expression of intent to physically harm or emotionally damage. In the event of threatening behavior by one of the students in the course, official policies and procedures will be followed as described at <http://policy.web.arizona.edu/~policy/threaten.shtml>.

**Changes to this syllabus:** The information contained in this syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructors.