# Plant Sciences 130 - Fall 2006

# PLANT BIOLOGY

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## Course web site and electronic materials:

Course home page: http://ag.arizona.edu/classes/pls130 This web site will be updated regularly so check it often! If you need to access a protected document from the site the username is [redacted] and the password is [redacted] (both all lowercase).

NOTE: Many files accessible from the course home page will only be available for downloading until 7 days after the information they contain is covered in lecture or laboratory. After this time, it will not be possible to access the files. Download early!

To be able to view many of the electronic files associated with this course (those with endings of ".pdf"), you will need to have Adobe Reader version 5.0 installed on the computer you are using. This free program may be downloaded from: http://www.adobe.com/products/acrobat/readstep2.html See the section entitled "More on downloaded files" below for information on printing.

## Course description:

This course deals with plant form and function from an evolutionary point of view and is intended for majors in all fields of biology. Emphasis is placed on understanding basic processes of metabolism, evolution, reproduction, growth, development, and physiology of nonvascular and vascular plants. These processes are considered within the context of the environments plants inhabit and human activities that affect or depend upon plants.

## Students completing PL S 130 will:

1. Understand the basic structures and processes involved in plant growth and development;
2. Appreciate the diversity found among plants and understand the basis for and significance of this diversity;
3. Understand how plants interact with their environment and the critical roles that plants play in all ecosystems;
4. Use scientific terminology to communicate effectively about plants;
5. Develop critical thinking skills by evaluating information from multiple perspectives, drawing reasonable conclusions, and defending them rationally; and
6. Have assumed complete responsibility for their performance in the course and actively worked to improve their organizational and time management skills.

## Major Topics:

**I. Cells: Structure and Energy**
**II. Form and Function**
**III. Genetics and evolution**

**IV. Regulation of Growth and Development**
**V. Evolution of Diversity**
**VI. Ecology and the Human Prospect**

**Texts:** *Biology of Plants* (6th or 7th Editions). Peter Raven, Ray Evert and Susan Eichhorn; and *Laboratory Topics in Botany*, 1999, Ray Evert and Susan Eichhorn (electronic copies of appropriate topics are provided on line).

## Student Evaluation:

| | | | |
|---|---|---|---|
| Midterm examinations (50 min.) | 3 @ 100 | = | 200 points* |
| Final examination (2 hr.) | 1 @ 200 | = | 200 |
| Quizzes | 12 @ 15 | = | 180 |
| Laboratory examinations (2 hr.) | 2 @ 75 | = | 150 |
| Citizenship | 60 | = | 60 |
| | | | --- |
| | | | 790 |

* *Best two* scores of the *three* midterm exams count. No make-up exams are given so a missed exam (score=0) will represent the omitted score.

Assignment of final grades is not based on any preconceived thresholds for letter grades, but roughly follows: >90% = A; 80-89% = B; 70-79% = C; 60-69% = D; <60% = E.

* *Biology of Plants*, 6th edition (1999). Go here for page numbers if you are using the 7th edition.

** *Biology of Plants*, 7th edition (2005)(on-line).

## Staying in contact:

Ask Dr. Smith, Kandres or Janon for clarification whenever you need it (with one exception, noted below)—in class, lab, during office hours, or by e-mail. Students are sometimes reluctant to ask for help because they think it's an imposition on the instructor. This is nonsense. The main reason why instructors are here is to answer your questions! The other reason students are reluctant to ask for help, especially in class, is that they sometimes think they're "the only one who doesn't get it." This is rarely true, so ask away. The exception mentioned above is this: Instructors will not be available to answer your questions in the 24 hours before an exam. You'll really have to plan ahead to get help.

You may be required to submit some assignments electronically as part of this course. Text should be submitted only in the body of your e-mail message. *No attachments will be accepted!*

## Absences and classroom conduct:

You are expected to attend all lecture and laboratory sessions. If an absence is anticipated, you must inform the instructor of the time and reason for the absence in advance. While in class you are expected to conduct yourself in a manner conducive to learning and in a way that does not interfere with other students' concentration.

## Missed exams or quizzes:

There are no make-ups for any exam or quiz. Exceptions may be made in rare circumstances, such as death in family, serious illness, or attending a University sponsored function out of town. As soon as you realize that you will be unable to attend a regularly scheduled exam, contact Dr. Smith immediately (e-mail is OK) and explain your situation. He will determine whether a make-up exam will be permitted and will inform you of the make-up date and any penalties that will be applied to your grade for the work.

## Special needs and accommodations:

Students who need special accommodation or services should contact the SALT (Strategic Alternatives Learning Techniques) Center for Learning Disabilities (SALT Center, 1010 N. Highland Ave., P.O. Box 210136, Tucson, AZ 85721, 520 621-1242, http://www.salt.arizona.edu/, and/or the Disability Resources Center, 1224 East Lowell Street Tucson, Arizona 85721, Ph: 621-3268, Fax: (520) 621-9423, e-mail: uadrc@email.arizona.edu, http://drc.arizona.edu/. The appropriate office must document the need for accommodations.

## Academic integrity:

You are encouraged to share intellectual views and discuss freely the principles and applications of the course materials. However, all examinations and quizzes must be executed independently, except as specifically noted by the instructor. This course operates under the Code of Academic Integrity as described at http://catalog.arizona.edu/policies/974/acacode.htm

It is unacceptable in this course to submit work without complete citation describing its source(s). For example, it is considered a violation of the Code of Academic Integrity to use work that was previously generated in another course (by you or someone else) to meet an assignment in this course without acknowledgment of this fact as part of the assignment.

As a student it is your responsibility to be completely familiar with and adhere to the rules for academic behavior discussed in the Code of Academic Integrity. *If you have any questions whatsoever, ask one of your instructors before you act. The consequences of not doing so may be extreme.*

## Incomplete Policy:

Any incomplete grade given must be verified with a written agreement with the student that specifies the work to be done and a timetable for completion. Incomplete grades are assigned only in extreme circumstances when it is impossible for the student to complete a minor portion of the work required for a course. These grades are not to be used as a mechanism to retake a course because of generally poor performance. For more information see: http://www.registrar.arizona.edu/gradepolicy/incomplete.htm

## Personal Privacy:

It may be impossible to completely maintain the anonymity of individual students taking this course relative to grades given on assignments, exams, or final grades at the completion of the course. Students may be asked to provide an alias (e.g. last four digits of phone number) that can be used in place of their name in an attempt to maintain anonymity. It is the student's responsibility to insure that this alias remains confidential as the possibility exists that this and the grade(s) associated with it will be available on bulletin boards in areas open to the general public.

Also, please note that Appendix D of the University Handbook for Appointed Personnel contains the following information regarding the release of student information as set forth by the Family Educational Rights and Privacy Act of 1974. Pertinent sections of this Appendix are reproduced below. This information may be important if you ask any of the instructors to write a letter of recommendation for you. Again, if you have any questions or concerns, ask the instructors first.

II. CONFIDENTIALITY OF STUDENT RECORDS

A. A student`s educational records (or personally identifiable information contained therein), other than directory information, shall not be accessible or released without the prior consent of the student unless authorized by law. Federal law recognizes that student educational records may be released, without prior consent of the student, under the following circumstances or to the following individuals:

1. Other officials of the University, including teachers, who have a legitimate educational interest in the information.

2. Officials of other schools in which the student seeks or intends to enroll, on the condition that the student upon request receives a copy of the record which has been transferred and has an opportunity to challenge upon request the content of the record.

# MEASURING LEARNING IN PLANT BIOLOGY

## 1. Lecture examinations (400 points)

The examinations in this course are designed to measure how well you are doing and to help you to be more effective in your learning. They will include mostly short-answer questions that involve both recall of facts and interpretation and integration of facts and general principles. Past exams may be available on line through the course web site. There are no make-up exams except under very special circumstances.

## 2. Friday quizzes (195 points)

There will be a 10-minute quiz beginning promptly at 9:00 a.m. each Friday morning. The purpose of the quiz is to motivate students to study throughout the semester and not just in the days preceding an exam. Quiz questions will be derived from that week's Key Points handout associated with the lab. The Key Points handout is both a summary of, and study guide for, the critical information contained in each lab session. The handout for the following week will be available online each Friday afternoon. Students are strongly encouraged to download and review the Key Points handout prior to the next lab.

Graded quizzes will be returned in lecture the following Monday. Quizzes not picked up at that time will be posted to a box outside Room 226 B Bio Sci East. There are no make-up quizzes except under very special circumstances.

## 3. Laboratory examinations (175 points)

Two 75-point practical examinations will be given in the laboratory. These non-cumulative exams will deal with all components of the laboratory and will last < 2 hours. The laboratory examinations will cover all lab topics, lab introductory material, the fieldtrip, and plants of the week. The first midterm will cover all material in Labs 1-7 and the second midterm will cover all material in Labs 8-14. The exam format will be practical in nature with sets of questions assigned to various stations on the lab benches. For example, one station may have a microscope with an unlabeled slide on the viewing platform. One of the

ocular lenses will have an arrow pointing to a structure on the slide. You will have to focus the microscope, identify the structure, and identify the function of the structure. Another station may contain one of our experimental set-ups and you might be asked a series of questions about the experiment. For example, you might be asked why the experiment was set-up the way it was, what were we testing, what the purpose of the control was, what would indicate a positive outcome, etc. There will be approximately 50 questions. There will be no order to the questions, thus you may start the exam at any station. When you have finished a question, move to the next open station until you have completed all the questions. You will be given 2 hours to complete the exam.

Strict academic integrity will be observed during the exam. Therefore, anyone found looking at another's exam, staring over someone's shoulder, or speaking to any other student will be assumed to be cheating and will receive a 0 on the exam.

## 4. Citizenship (60 points)

We evaluate participation to encourage everyone to become engaged in the course. Each student begins the semester with the full 60 points of participation credit. When students fail to meet participation requirements, points will be deducted. For example, the cornerstone of participation is good attendance and we will periodically administer pop quizzes as a means to record attendance on any one day. Participation also involves asking or answering questions in lecture or laboratory, speaking with or otherwise communicating with the instructors outside of class, actively helping your fellow students to learn, and being good citizens of the classroom. The balance of your participation grade is based on the instructors' objective and subjective evaluation of these activities.

## More on downloaded files

You will want to print paper copies of at least some of the files you download to assist you in taking notes in lecture and lab. To save paper, you may wish to print multiple slides (pages) from pdf files on single pieces of paper. The default in the Adobe Reader is one slide per page. When in the reader you may change this by clicking on:

Mac--**File → Print → Copies & Pages → Layout** and then select the number of slides that you would like to print per page (1, 2, 4, 6, 9 or 16).

Windows--**File → Print Setup → Properties** and then select the number of slides that you would like to print per page (1, 2, 4, 6, 9 or 16).

## SOME SUGGESTIONS ON HOW TO BE A BETTER STUDENT

1. Plan how you want to use your time. Use daily, weekly, and semester calendars to keep track of appointments and assignments. Write down important dates and times. Brains are for important tasks -- like thinking.
2. Review lecture and notes within 24 hours.
3. Keep your class materials in a 3-ring binder. Do it as you go.
4. Form a study group.
5. Establish a regular study routine. Study at the same time for the same duration at the same place.

6. Prepare for exams from the first day of class. Everything you do is exam preparation. Watch and listen for potential exam questions. Use the week before the exam to review NOT to learn.
7. Seek help when you need it (everyone does from time to time).

The University Learning Center (http://www.ulc.arizona.edu/) has lots of resources available to help you learn. Take a look.

> *May your trails be crooked, winding, lonesome, dangerous, leading to the most amazing view. May your mountains rise into and above the clouds. May your rivers flow without end, meandering through pastoral valleys tinkling with bells, past temples and castles and poets towers into a dark primeval forest where tigers belch and monkeys howl, through miasmal and mysterious swamps and down into a desert of red rock, blue mesas, domes and pinnacles and grottos of endless stone, and down again into a deep vast ancient unknown chasm where bars of sunlight blaze on profiled cliffs, where deer walk across the white sand beaches, where storms come and go as lightning clangs upon the high crags, where something strange and more beautiful and more full of wonder than your deepest dreams waits for you—beyond that next turning of the canyon walls*
>
> **Edward Abbey**

# Schedule for Fall 2006
# Plant Sciences 130

| Date | Lecture/Lab | Subject | Reading assignment * |
|---|---|---|---|
| 21 Aug | 1 | Course introduction, what is botany? | Chapter 1, Lab reading |
| 22 Aug | Lab 1 | Fruits | |
| 23 Aug | 2 | Lec 1; Molecular composition of plant cells | p. 16-28; 30-39 |
| 25 Aug | 3 | **Quiz.** Plant cells | p. 40-56; 58-72 |
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| 28 Aug | 4 | Lec 3 | |
| 29 Aug | Lab 2 | Microscope; Plant cells — Topics 1 and 3 | |
| 30 Aug | 5 | Membrane structure and function | p. 73-84; 87-91 |
| 1 Sep | 6 | **Quiz.** Lec 5 | |
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| 4 Sep | LABOR DAY HOLIDAY | | |
| 5 Sep | Lab 3 | Movement into and out of cells — Topic 5 | |
| 6 Sep | 7 | The reproduction of cells | Chapter 8 |
| 8 Sep | 8 | **Quiz.** Meiosis and sexual reproduction | Chapter 9 |
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| 11 Sep | 9 | Flow of energy in biological systems | p. 92-98; 105-107 |
| 12 Sep | Lab 4 | Mitosis, Meiosis — Topics 4 and 8 | |
| 13 Sep | 10 | Respiration | Chapter 6 |
| 15 Sep | 11 | **Quiz.** Lec 10 | |
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| 18 Sep | 12 | EXAM 1 – Lectures 1-11, Laboratories 1-4 | |
| 19 Sep | Lab 5 | Field trip to Karsten Turfgrass Center | |
| 20 Sep | 13 | Photosynthesis, light and life | Chapter 7 |
| 22 Sep | 14 | **Quiz.** Lec 13 | |
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| 25 Sep | 15 | Early development of the plant body | Chapter 23 |
| 26 Sep | Lab 6 | Photosynthesis — Topic 7 | |
| 27 Sep | 16 | Cells and tissues of the plant body | Chapter 24 |
| 29 Sep | 17 | **Quiz.** The root: Structure and development | Chapter 25 |
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| 2 Oct | 18 | The shoot: Primary structure and development | Chapter 26 |
| 3 Oct | Lab 7 | Cells, Tissues, Stems, Leaves — Topics 21, 23, 24 | |
| 4 Oct | 19 | Secondary growth in stems | Chapter 27 |
| 6 Oct | 20 | **Quiz.** Regulating growth and development | p. 672-686; 693-701 |
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| 9 Oct | 21 | External factors and plant growth | Chapter 29 |
| 10 Oct | Lab 8 | Laboratory midterm 1, Laboratories 1-7 | |
| 11 Oct | 22 | The movement of water and solutes | Chapter 31 |
| 13 Oct | 23 | Lec 22 | |
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| 16 Oct | 24 | Genetics and the basic processes of evolution | p. 183-184; 235-238; 258-259 |
| 17 Oct | Lab 9 | Synthesis Laboratory: Water movement through plants | |
| 18 Oct | 25 | Lec 24 | |
| 20 Oct | 26 | EXAM 2 – Lectures 12-25, Laboratories 5-9 | |
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| 23 Oct | 27 | Systematics-The science of diversity | p. 260-268; 275-280 |
| 24 Oct | Lab 10 | Woody stems, Secondary xylem, Dendrochronology — Topic 25 | |

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| 25 Oct | 28 | *Protista* I | | p. 347-352; 356-369 |
| 27 Oct | 29 | **Quiz.** *Protista* II | | p. 370; 375-399 |
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| 30 Oct | 30 | Bryophytes | | Chapter 18 |
| 31 Oct | Lab 11 | Bryophytes – Topic 14 | | |
| 1 Nov | 31 | Seedless vascular plants | | Chapter 19 |
| 3 Nov | 32 | **Quiz.** Lec 31 | | |
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| 6 Nov | 33 | Gymnosperms | | Chapter 20 |
| 7 Nov | Lab 12 | Gymnosperms — Topic 17 | | |
| 8 Nov | 34 | Introduction to the angiosperms | | Chapter 21 |
| 10 Nov | **35** | **Quiz.** Angiosperm evolution | | Chapter 22 |
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| 13 Nov | VETERAN'S DAY HOLIDAY | | | |
| 14 Nov | Lab 13 | Plant Taxonomy | | |
| 15 Nov | 36 | EXAM 3– Lectures 27-35, Laboratories 10-13 | | |
| 17 Nov | 37 | **Quiz.** The dynamics of communities and ecosystems | | See lecture 38 |
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| 20 Nov | 38 | Lec 37 | http://bcs.whfreeman.com/raven7e/content/cat_010/ch31.pdf ** | |
| 21 Nov | Lab 14 | Field trip to AZ-Sonora Desert Museum – Adaptation to arid environments | | |
| 22 Nov | 39 | Global ecology | http://bcs.whfreeman.com/raven7e/content/cat_010/ch32.pdf ** | |
| 24 Nov | THANKSGIVING RECESS | | | |
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| 27 Nov | 40 | Lec 39 | | |
| 28 Nov | Lab 15 | Laboratory midterm 2, Laboratories 9-13 | | |
| 29 Nov | 41 | Lec 40 | | |
| 1 Dec | 42 | Invasive plants | | ???? |
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| 4 Dec | 43 | The human prospect | | Chapter 34 |
| 5 Dec | Lab 16 | Invasive plants; in-lab. **In-lab Quiz.** | | |
| 6 Dec | 44 | Catch up and review for Final exam | | |
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| 15 Dec | Final exam (Comprehensive) 8:00 – 10:00 | | | |

* *Biology of Plants*, 6th edition (1999). Go here for page numbers if you are using the 7th edition.

** *Biology of Plants*, 7th edition (2005)(on-line).