PLS360/MCB360 – Plant Growth and Physiology (in class section)

Spring 2020 Syllabus

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Course Description:
This course will introduce students to how plants grow, interact with their environment, and can potentially be modified to improve agriculture. We will focus on both the macro (e.g., plant architecture) and micro (e.g., proteins and metabolites) levels for a comprehensive understanding on what makes plants unique among living organisms. Students who successfully complete this class will have a strong foundation in basic plant biology that will support further learning in crop production, plant pathology, plant development, or laboratory research.

Office hours:
Marley 541E, Tuesdays 12-2 pm. Dr. Woodson will meet with students one-on-one every Tuesday 12 -2 pm unless stated otherwise. No appointments are necessary. If a student would like to meet with Dr. Woodson outside of office hours, an appointment must be set up by email at least 24 hours in advance.

Course Objectives:
This course covers how plants grow and live in the world in three parts. Part one will cover how plants acquire the nutrients and resources they need for growth and survival. Part two will cover plant growth and development and how this is timed to match their environment. Part three will cover a plant's relationship to their surroundings and how a plant navigates the various stresses in nature.

Expected Learning Outcomes for PLS360/MCB360:

Following the successful completion of this course, students should be able to:

1. Describe how the common architecture of plants allows them to survive and/or thrive in dynamic environments with limited resources.
2. Explain and discuss why plants need to be able to sense their environment and why this ability is crucial for their survival.
3. Identify and explain the structural and molecular diversity of plants and how this variation allows different plants to grow in different environments and situations.
4. Describe how a plant experiences stress, how plants can differentiate stresses, and the strategies plants use to avoid and/or tolerate these stresses.
5. Develop critical thinking skills about how the understanding of plant physiology can be used to improve crop quality/yield and/or solve global agricultural/energy problems in the present and the future.

Prerequisites:
MCB 181 and 182; CHEM 103A, 103B, 241A, and 243A are required. PLS 312 (or equivalent genetics course), PLS 240, and PLS 359 are recommended. For more information, please view the

file "Am I prepared for PLS 360" on D2L or ask/email the instructor. It is the responsibility of the student to be prepared for this class. If one realizes they may not have taken the appropriate classes before-hand, let the instructor know as soon as possible. Do not wait!

Course materials:
The textbook for this class is *Plant Physiology*, Sixth edition, by Taiz and Zeiger. *This textbook is optional* but recommended for further reading as many of the lectures will follow specific chapters. There will be a *required writing assignment* based on *The Botany of Desire: A Plant's-Eye View of the World* by Michael Pollan. All other material will be available on D2L.

Website:
This course will use D2L (http://www.d2l.arizona.edu/) for access to all materials (including lectures), important announcements, and all quizzes. Students will also be encouraged to use the discussion forums to ask questions, post answers, or to generate discussion about the class and/or topic of plant physiology.

Grading policy:
Final grades will be awarded based on the cumulative points from each of the assignments, quizzes, and exams (see below). Letter grade cutoffs will be the UA standard; ≥ 90% = A, 80-89.99% = B, 70-79.99% = C, 60-69.99% = D, < 60% = E. Any adjustments (curves) are not guaranteed and are completely up to the discretion of the instructor

Available points:

Quizzes	100 points (highest 10 scores, 10 points each)
Writing assignment	100 points
Exam 1	100 points
Exam 2	100 points
Final Exam	200 points
Total	**600 points**

Quizzes:
All quizzes are mandatory and will be accessible on D2L. **Each week quizzes will become available on Thursday mornings and must be completed by the following Sunday at 11:59 pm.** Once started, you will have three hours to complete the quiz. Quizzes are open book, open notes, and can be taken in the company of other classmates. I encourage you to work together, but please do not post answers on D2L or other forums. The lowest two quiz scores (out of 12) will be dropped. Not completing a quiz on time earns a score of 0.

On the first week there will be one practice quiz on D2L. This quiz is meant to assess prior learning and *will not be graded*. This is the only closed book exam and should be taken alone without any help from the internet. You will receive bonus points for completing it.

Discussion forum:
To foster learning and collaboration, I strongly encourage participation in this class, which can happen in at least three ways:

- Asking questions or making comments in class. Students can raise their hand at any time during lecture to signal that they have a question or comment to make.
- Meeting with the instructor during office hours or during a scheduled meeting.
- Posting questions or comments on the D2L discussion forum

The D2L discussion forum will be an excellent place for students to ask questions or post comments about the class or topics related to plant physiology. After most lectures, questions about the latest topics will be posted to foster further discussion and thinking. These will be great study aids and I highly encourage you to participate. I will moderate all discussions and may provide clarification or additional comments when necessary.

To get used to the forum, tell us about your favorite plant right now and receive some bonus points.

Writing assignment:
The required writing assignment in this class will be based on your reading of *The Botany of Desire: A Plant's-Eye View of the World* by Michael Pollen. This book contains four chapters, each describing how one particular plant (tulip, cannabis, potato, and apple) has been influenced by humans as well as its impact on our society. Your assignment is to choose one of these plants and write a short (~750 word) essay based on that chapter. Detailed instructions and grading rubrics will be available on D2L. **The essays will be due Sunday March 22nd at 11:59 pm**.

Examinations:
This course will have three exams (two midterm exams and one cumulative final exam). Exam one will cover all lectures up to that point. Exam two will cover material after exam 1. Exam 3 will be split into two equal halves; one half covering material presented after exam 2, and one half covering all material. **Exams will be administered on D2L, will be open book, and open notes, but must be taken alone.** You will take these exams through D2L on exam day any time between 12:00 am and 11:59 pm (a 24 hour window). Once started, you will have 75 minutes to complete the midterms and 120 minutes to complete the final. Unlike the quizzes, I expect you to take the exams alone. If you have general questions about this change, please post on the discussion forum so the class can see my answers. Any personal questions should be sent to me by email.

Honors contract:
Please inquire with the instructor during the first week of class if you are interested in taking this course for Honors credit.

Missed exams:
If you know in advance that you will be unable to take an exam at the scheduled time, I require a 72 hour notice. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion and absences pre-approved by the UA Dean of Students (or Dean designee) will be honored as long as that 72 hour advanced notice is given. In the case of a special emergency that greatly interferes with your ability to take the exam, email the instructor as soon as possible. All requests like this to reschedule an exam will be taken on a case-by-case basis at the direction of the instructor.

Communicating with the instructor:
There are three ways to contact the instructor;

1. Email. This is the preferred method and I will reply within two academic days. I will not, however, reply to emails the day of an exam.
2. Office hours, 12-2 pm on Tuesdays, Marley 541E. No appointment is necessary.
3. Posting questions on the DSL discussion forum. This is great for general questions about the course that another student may be able to answer more quickly.

Student conduct:
Like in all other classes here at the University of Arizona, you will be expected to act respectfully towards fellow students, the instructor, and teaching assistants. Any students that do not abide by this rule or are generally disruptive in class will be asked to leave. Similarly, online conduct must follow the same rules and inappropriate behavior or comments will not be tolerated. Students are expected to be familiar with and to abide by the Arizona Board of Reagent's policy on threatening behavior, which prohibits threats of physical harm to any member of the University community, including to one's self (ABOR Policy 5-308, policy.arizona.edu/education-and-student-affairs/threatening-behavior-students). Students should also review the OIA's guide for online learning at: http://enlinea.oia.arizona.edu/what_is2.html.

Special needs accommodations:
If you expect, anticipate, or experience physical or academic barriers based on disability, please let the instructor know immediately so that we can discuss options. You are also encouraged to contact **Disability Resources (520-621-3268)** to establish reasonable accommodations. Students desiring special accommodation or services must register with the Disability Resources Center and request that official notification be sent to the instructor as soon as possible. The need for accommodations must be documented by the appropriate office. Students experiencing medical or emotional conditions that impact performance in the course but are not registered with the DRC should fully explain the situation to the instructor in writing before the exam or due date in mind (the instructor will keep this information confidential as much as possible, although no guarantees are made). Notifying the instructor after an exam or assignment due date will not lead to a change in scoring.

Student code of academic integrity:
All work in this class (quizzes, writing assignment, and exams) must be from the student's own work. All students should be familiar with and adhere to the UA Code of Academic Integrity as described in the UA General Catalog (http://deanofstudents.arizona.edu/codeofacademicintegrity). Infractions may result in course failure or university expulsion.

Course withdrawal policy:
If a student wishes to withdraw from the class, they must let the instructor know by email as soon as possible and must follow the procedure set by the UA General Catalog. The student is responsible for initiating this process and being aware of all UA deadlines.

Incomplete grades:
In general, incomplete grades will not be granted for this class except in rare cases. Any request for incomplete grades must be made in writing or email as soon as possible and will be reviewed on a case-by-case basis.

Confidentiality:
Student records will remain confidential in accordance with FERPA (http://www.registrar.arizona.edu/ferpa/default.htm).

Copyright:
Per the Code of Academic Integrity, the learning materials from this class may not be distributed or reproduced for commercial purposes. This includes any lectures, notes, or recordings made by the instructor.

Changes to Syllabus:
Everything listed in this syllabus, except for grading, is subject to change over the course of the semester. Any such changes will be advertised on the D2L announcement page and in lecture.

PLS360/MCB360 Plant growth and physiology

Spring 2020 lecture and exam schedule (in class section).
R P Harvill Bldg, Rm 415 9:30-10:45 am Tuesdays & Thursdays

Week of	Lectures	Taiz & Zeiger reading	Quiz
Jan 16	1. Introduction		Quiz 0 - practice
Jan 21/23	2. Water transport 3. Nutrient uptake	Ch. 3, 4, pp. 83-118 Ch. 5, 6, pp. 119-170	Quiz 1
Jan 28/30	4. Light reactions 5. Carbon reaction	Ch. 7, pp. 171-202 Ch. 8, pp. 203-244	Quiz 2
Feb 4/6	6. Regulation of photosynthesis 7. Carbohydrate metabolism & transport	Ch. 9, pp. 245-268 Ch. 11, pp. 285-316	Quiz 3
Feb 11/13	8. Respiration 9. Primary and secondary metabolism	Ch. 12, pp. 317-352 Ch. 13, pp. 353-376	Quiz 4
Feb 18	**10. Exam 1**		
Feb 20	11. Growth	Ch. 14, pp. 380-406	
Feb 25/27	12. Developmental transitions 13. PLP episode "Flowering"	Ch. 15, pp. 407-446 Ch. 20, pp. 591-624	Quiz 5
March 3/5	14. Reproduction and death 15. Hormones part 1	Ch. 21, 22, pp. 625-664 Ch. 18, pp. 513-552	Quiz 6
March 10/12	Spring Break		
March 17/19	16. Hormones part 2 17. Hormones part 3	Ch. 15	Quiz 7; **Essays due Mar. 22nd**
March 24/26	18. Hormones part 4 19. Hormones part 5	Ch. 15	Quiz 8
March 31	**20. Exam 2**		
April 2	21. Light signaling	Ch. 16 pp. 447-476	
April 7/9	22. TBA 23. Abiotic stress	Ch. 24, pp. 731-760	Quiz 9
April 14/16	24. PLP episode "Surviving" 25. Biotic stress	Ch. 23 pp. 693-730	Quiz 10
April 21/23	26. Symbiosis 27. PLP episode "Living together"		Quiz 11
April 28/30	28. Movements 29. Improving agriculture	Ch. 16, 18	Quiz 12
May 5	30. Final exam review		
May 12	**Final Exam**		**Final Exam 8-10am**