

**PLANT CELL STRUCTURE AND FUNCTION
PLS 359**

LOCATION: Harvil Bldg, Rm 140

TIME: Fall 2019; Tu/Th; 11:00 AM – 12:15 PM

PREREQUISITES

Required: MCB 181, MCB 182, CHEM 151,
CHEM 152, CHEM 241A, CHEM 243A

PREREQUISITES

Recommended: PLS 240, PLS 312 or equivalent

INSTRUCTOR:

Dr. Ravi Palanivelu
Associate Professor, School of Plant Sciences
University of Arizona, Tucson, AZ 85721
Office: Marley 441E
Phone: 520-626-2229
rpalaniv@email.arizona.edu

OFFICE HOURS: **Tuesday** **1pm – 2pm**
 Thursday **1pm – 2pm**

TA:

Aaron White
aaronwhite206@email.arizona.edu

TA OFFICE HOURS: **Monday** **10:30am – 11:30am**
 Wednesday **10:30am – 11:30am**

OFFICE HOURS

LOCATION: **MARLEY 821E**

SUGGESTED

TEXT BOOKS:

(i) Biology of Plants, Seventh Edition, W. H. Freeman and Company, New York, NY. Authors: Peter H. Raven, Ray F. Evert, and Susan E. Eichhorn
(ii) Plant Physiology, Fifth Edition, Sinauer Associates, Sunderland, MA. Authors: Lincoln Taiz, and Eduardo Zeiger

D2L SITE: <http://www.d2l.arizona.edu/>

COURSE DESCRIPTION: Whether you will work with plants as a physiologist, pathologist, ecologist, agronomist, horticulturalist, or molecular biologist, you will need to know how a plant is constructed, how it grows, and how it functions. Depending on the need and your interests, you may work at the subcellular, cellular, tissue, organ, or whole plant level. As a result, it is important to have a comprehensive understanding of plant cell structure and function.

In this course, we will start with the molecular and subcellular organization of a single plant cell. Subsequently, we will investigate tissue levels of organization and function. Emphasis will be placed on not only teaching the structural aspects but also discussing the functions of a plant cell, tissue, and organ. Organ and whole plant growth and physiology will be covered in PLS 360 (Plant Growth and Physiology), a course that will be offered in the spring semester.

COURSE OBJECTIVES AND EXPECTED LEARNING OUTCOMES:

- (i) Provide an understanding of the structure of a typical plant cell and its organelles
- (ii) Provide anatomical descriptions of plant tissues and organs
- (iii) Demonstrate the complexity and orderliness of the organization found in higher plants.
- (iv) Describe the functions of plant cell organelles, tissues, and organs.

TOPICS: Please see at the end of this document a detailed list of topics to be covered in this course.

GRADING#:

3 exams	300 points (100 points each)
Take home exams (on research articles) (3)	240 points (80 points each)
Quiz on discussion of research articles (3)	60 points (20 points each)

Total	600 points
-------	------------

Final grade will be decided based on a total of 600 points.

GRADE DISTRIBUTION: Your final grade will be solely based on a percentage scale (i.e., 90-100% = A, 80-90% = B; 70-79% = C; 60-69% = D; 59% or below = E). ***No curving will be done either for any exam or the final total scores.***

EXAMINATION SCHEDULE (all three exams will be in the class meeting room – Meinel Optical Sci, Rm 422):

Exam 1	10/03/2019 (11:00 AM – 12:15 PM)
Exam 2	11/07/2019 (11:00 AM – 12:15 PM)
Exam 3	12/17/2019 (11:00 AM – 12:15 PM)

INCOMPLETE POLICY: An incomplete grade will not be given unless there is a prior written agreement between the instructor and the student. The agreement should clearly outline the work to be done and a timetable for completion.

COURSE METHODOLOGY: Lecture materials will be provided as powerpoint files; in classroom aids (Elmo and chalk board) will be used.

TEACHING FORMAT: In-classroom lecture.

COURSE WITHDRAWAL POLICY: Students must execute withdrawal procedures according to the University of Arizona General Catalog. If a student misses two or more consecutive classes, he/she is subject to 'administrative drop' unless alternative arrangements have been made between the instructor and the student.

ATTENDANCE Students are expected to attend every class and remain for the entire class period. Excessive absences may result in an administrative drop of the student from the class. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean designee) will be honored.

CLASSROOM BEHAVIOR: While in class, you are expected to conduct yourself in a manner conducive to learning and one that does not interfere with other students' or the instructor's concentration or attention. It is expected that you learn to think critically as demonstrated by evaluating course information from multiple perspectives, drawing reasonable conclusions, and defending these conclusions rationally. Please be familiar with the Arizona Board of Regents' Student Code of Conduct <http://web.arizona.edu/~policy/threatening.pdf>

Questions and discussion are encouraged. However, each student is encouraged to help create an environment during class that promotes learning, dignity, and mutual respect for everyone. Deviations from these requirements could result in disciplinary action under the Student Code of Conduct, <http://deanofstudents.arizona.edu/codeofacademicintegrity>.

Please turnoff your cell phone before the lecture begins and refrain from surfing the internet or tending to other matters not related to this course.

The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.web.arizona.edu/~policy/threaten.shtml>.

SPECIAL NEEDS AND ACCOMMODATIONS STATEMENT: Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, and website URL: <http://drc.arizona.edu/>. You must register and request that the DRC send me an official notification of your accommodation needs as soon as possible.

It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. Please plan to meet with me by appointment or during office hours to discuss accommodations and how course requirements and activities may impact your ability to fully participate. The appropriate office must document the need for accommodations. I will do everything I can to accommodate your needs in order to enhance your learning experience, but I must know ahead of time. Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

STUDENT CODE OF ACADEMIC INTEGRITY: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/codeofacademicintegrity>

CONFIDENTIALITY OF STUDENT RECORDS: Student records will remain confidential in accordance with FERPA <http://www.registrar.arizona.edu/ferpa/default.htm>

COPYRIGHT: The instructor holds copyright for all lectures and original course materials. This includes notes taken by students that substantially reflect the lecture content. Copyrighted material is available for personal use by students and may be shared among students, however lecture notes may not be distributed or reproduced for a commercial purpose without the express written consent of the instructor. Selling your lecture notes online or in any other way is a violation of copyright and of the Code of Academic Integrity.

SUBJECT TO CHANGE STATEMENT: Information contained in the course syllabus may be subject to change with advance notice, as deemed appropriate by the instructor.

LECTURE TOPICS

Aug. 27	Introduction and overview of plant development
	<u>Components of the plant cell</u>
Aug. 29	Lecture 1: Macromolecules 1: Carbohydrates and lipids
Sep. 3	Lecture 2: Macromolecules 2: Proteins and nucleic acids
Sep. 5 and 10	Lectures 3 and 4: The plant cell wall
Sep. 12	Lecture 5: Take Home Exam 1 Discussion on Research article on Plant Cell Walls; Quiz on discussion = 20 points
Sep. 17	Lecture 6: Plasma membrane and cytoplasmic organelles
Sep. 19	Lecture 7: The cytoskeleton: microtubules and microfilaments
Sep. 19	Take Home Exam 1 due @11:59pm (on Plant Cell Wall Research Article; 80 points)
	<u>Origin, structure, and function of the primary plant body</u>
Sep. 24	Lecture 8: Overview of plant growth
Sep. 26	Lecture 9: The shoot apical meristem
Oct. 1	Lecture 10: The root apical meristem
Oct. 3	In Class Exam 1 (11am – 12:15pm in Meinel Optical Sci, Rm 422; 100 points; on topics covered Aug. 27- Oct.1; 100 points; take home exam article 1 is not included)
Oct. 8	Lecture 11: Tissues 1: The dermal system
Oct. 10	Lecture 12: Take Home Exam 2 Discussion on Research article on cotton fiber (an epidermal cell); Quiz on discussion = 20 points
Oct. 15	Lecture 13: Tissues 2: The ground system
Oct. 17	Lecture 14: Tissues 3: The vascular system (xylem and phloem)

Oct. 17 **Take Home Exam 2 due @11:59pm on cotton fiber Research Article; 80 points**

Origin, structure, and function of secondary plant body

Oct. 22 Lecture 15: Lateral meristems

Tissue organization in plant organs (stems, leaves, roots, and flowers)

Oct. 24 Lecture 16: Stems

Oct. 29 Lecture 17: Roots 1

Oct. 31 Lecture 18: Roots 2

Nov. 5 Lecture 19: Water conductance by xylem

Nov. 7 **In Class Exam 2 (11am – 12:15am in Meinel Optical Sci, Rm 422; 100 points; on topics covered Oct. 8 to Nov. 5; 100 points; take home exam article 2 not included)**

Nov. 12 Lecture 20: Mycorrhizae

Nov. 14 Lecture 21: Root nodules

Nov. 19, 21 Lectures 22 and 23: Leaves

Nov. 26 Lecture 24: Flowers 1

Dec. 3 Take Home Exam 3 Discussion on the Research article on early flowering citrus trees;
Quiz on discussion = 20 points

Dec. 5 Lecture 25: Flowers 2

Dec. 10 Lecture 26: Double Fertilization and Embryogenesis

Dec. 10 **Take Home Exam 3 due @11:59pm on early flowering citrus trees; 80 points)**

Dec. 17 **In Class Exam 3 (10:30 am - 12:30 pm; Meinel Optical Sci, Rm 422; 100 points; on topics covered from Nov. 12 to Dec. 10; take home exam article 3 not included)**