

Syllabus Plant Cell Biology Spring 2019

Plant Cell Biology - BOT 4542

2:00 - 4:50 TUESDAY

Sanson Life Sciences Bldg SC 119

Credit hours: 3

Format: In Person

On Line course: No

Course number: BOT 4542

Prerequisites: This course has been listed with no prerequisites except BSC 1010 and BSC 1011. However preparation in introductory plant biology, undergraduate cell and molecular biology and undergraduate plant physiology will best prepare you for success. If you lack adequate preparation you will need to plan extra study time to keep up with the material.

Instructor contact information

Instructor: Dr. Xing-Hai Zhang

Office: SC Office Hours: Tuesday 11-2 or by appointment

Office Phone: 561 297-1011

E-mail Address: xhzhang@fau.edu

Required text

The text is *The Molecular Life of Plants*. First edition. Jones, Ougham, Thomas and Waaland. 2013. The book may be purchased as a new or used hard copy or paperback, electronic copy or rented from the publisher, Wiley-Blackwell. ISBN 978-0-470-87012-9 (paperback). ISBN 978-0-470-87011-2 (hardback). There are used copies available on Amazon as well as new copies and links to purchase rental copies and electronic copies from the publisher and in the FAU Bookstore. It is not available in the FAU Library or through interlibrary loan. The book should be purchased before the first day of class.

There is a companion web site www.wiley.com/go/jones/molecularlifeofplants that can be accessed with power points of all figures and PDFs of tables. At the present time this can be accessed without an access code needed. There are no text or study guides on the web site.

In addition, if you have limited plant biology background you may want to purchase a copy of Raven, Biology of Plants by Evert and Eichhorn. ISBN 978-1-4292-1961-7 8th edition WH Freeman and Company. Used copies of the earlier 7th edition are available from Amazon very inexpensively and have sufficient background material.

Additional materials as needed.

Course description

Plant Cell Biology covers the cell biological aspects established in plant anatomy, plant physiology, plant growth and development, plant taxonomy, plant biochemistry, and plant molecular biology. An emphasis is made on experimental approaches used to understand these processes at the molecular level. A discussion of model organisms and cell types will be included. Format will include lectures, discussions, and in-class student presentations.

This is an exciting time for plant biology!!! Plants are the basis of all life on Earth. They are components of natural ecosystems; as crops used for food, feed and materials; used as model systems to understand all eukaryotic cellular function; and also used to understand human biology and disease at a cell and molecular level. Plant cell biologists are beginning to understand the complex signals and molecular networks of plants that make them unique while sharing cellular characteristics of all eukaryotic organisms.

We will emphasize scientific communication, examination of current literature (both primary and secondary sources) and developing personal skills. Grant writing and grant awarding procedures and processes will be covered as well as scientific oral presentations.

Some course materials (syllabus, reading assignments, announcements, team projects, plants in the news articles, etc.) will be available on FAU Canvas (the new course management system for FAU). <https://canvas.fau.edu/>

Course objectives/student learning outcomes

This course is designed to introduce upper division undergraduates to contemporary plant cell and molecular biology. Advances in plant cell biology are due to the intersection of plant

biochemistry, physiology, genomics, development, molecular biology and evolution research. New techniques, model organisms, international cooperation and dedicated new instrumentation have also played a major role in our understanding of plant cell biology. Students will learn the unique features of the plant cell, the plant genomes, and growth and development at a cellular level. Scientific communication at the researcher, university student and the informed citizen level will be mastered. The importance of plants as components of natural ecosystems; as crops used for food, feed and materials; and as model systems to understand all eukaryotic cellular function will be demonstrated. The complex signals and molecular networks of plants that make them unique while sharing cellular characteristics of all eukaryotic organisms will be learned.

Canvas

Canvas is the learning management system (LMS) used at FAU for courses. Your username and password for Canvas is the same used to log into your myFAU. For this course, you can:

- View the course syllabus
- Check test dates and instructions
- View Power points of the lectures
- See supplemental help like practice quizzes and study guides posted before each quiz
- Check for announcements
- View grades

It is important to learn how to navigate Canvas for all your FAU courses. Go to <https://canvas.fau.edu/courses/6269> or link through your MyFAU page to the Canvas Student Training Course. The purpose of this course is to prepare students to use Canvas with their courses (traditional, hybrid, and online) and serve as a resource that can be referred back to after training is completed.

There are multiple ways to get support for Canvas-related issues or questions. Call the toll-free number (855) 691 7827 or call the FAU helpdesk at 561.297.3999 and choose Option 3. If you are logged into Canvas (<https://canvas.fau.edu>), click on the Help icon at the bottom left corner, under the global menu. You will be able to chat with a Canvas representative by clicking on "Chat with Canvas Support."

Course structure

Most class meeting will be composed of (1) a lecture, (2) a quiz on the prior week's lecture and past and current reading assignments, (3) team meeting times (4) student presentations and (5) "plants in the news" presentations. An announced "mega quiz" covering multiple lectures or readings will be given. Class attendance is mandatory and there is no make up for missed quizzes or late assignments. One quiz grade will be dropped.

At the first meeting the class will form teams of undergraduates and graduate students. The team will be responsible for two class presentations on topics chosen early in the semester. The presentation must be accompanied by handouts for the class. Team members will usually share the same grade for the assignment. More instructions will be given in class.

Undergraduates will write a short paper on a topic assigned in class. The paper will be 4-6 pages in length and will be based on readings in the textbook or topics in the news (using primary and/or secondary research sources). The paper topic will be assigned by February 7st. **The paper is due at the beginning of class on April 11.** I will comment on early drafts up until April 4th.

Course topical outline and text book reading assignment:

This may be modified as the semester progresses. Lecture topics and associated readings subject to change; mega quiz and final exam dates firm. The out-of- classroom assignments are expected to take at least 6 hours per week of (1) textbook-assigned readings, (2) review of lecture notes and supplemental materials posted on Canvas, (3) study, (4) practice test-taking, (5) plants in the news research (6) research for and preparation of group presentations, (7) research and writing of assigned paper and (8) tutoring or additional individual help from Professor as needed.

Week	Topic	Readings	Quiz
January 10	Introduction to Plant Biology	Chapter 1	
January 17, 24	Cell Architecture	Chapter 4	Quiz, quiz
January 31	Genomic Organization and Expression	Chapter 3	Quiz
February 7, 14	Membrane transport and protein trafficking	Chapter 5	Quiz, Quiz
February 21, 28	The cell cycle and meristems	Chapter 11	Quiz, Mega quiz

Spring Break March 7

March 14	Growth and development	Chapter 12 Quiz
March 21, 28	Light perception at cell level	Chapter 8, 9 Quiz, Quiz
<i>Suggested date: March 28 for submitting paper draft</i>		
April 4	Intercellular Transport	Chapter 14 Quiz
<i>Last date for submitting paper drafts if requested.</i>		
April 11-18	Flowering and sexual reproduction	Chapter 16 Quiz,
<i>Student Papers: Due at start of class April 11</i>		
Exam week: Tuesday May 2 nd	1:15- 3:45	Final Exam

Course evaluation method

Up to 13 multiple choice and essay quizzes will be given each during class time including a longer cumulative quiz (Mega quiz) and a cumulative final. The lowest regular quiz score will be dropped in calculation of final grade. The mega quiz and final will count as two quiz grades and may not be dropped. Therefore no make-up quizzes will be given. Undergraduates and graduates will have different quizzes. 60% of total grade

The class team presentations will be graded on content, understanding of the subject, completeness of presentation, clarity and handouts. 30% of total grade.

The student papers will be graded on content, completeness of review, understanding, depth of critical analysis, organization and grammatical correctness. **Paper due at the start of class on April 11, 2015.** 10% of total grade.

Extra credit: For each "plants in the news presentation" 1% point will be added to final grade. (Limit 5 % points).

Suggested Topics for Group Presentations

Specialized plant cells: Stomata, root hairs, collenchyma, storage cells, pollen grains, sperm, xylem, phloem, endosperm, cork, wood, storage cells, sclerenchyma, trichomes, epidermal cells, fibers, rootcap, spores

Specialized plant cell features: Plasmodesmata, cell wall synthesis, apical meristems, root tip growth, lateral meristems, motile sperm, gametophyte generation (ferns, bryophytes), pollen

grains and fertilization, plant embryos and seeds, seed dispersal mechanisms, cytoplasmic streaming, chloroplasts, chloroplast genomes, plant mitosis and cytokinesis, phragmoplast and cell division, vacuole, cutin, waxes, secondary plant metabolites, phytochrome and light perception

Plant cellular genetics: Nuclear genome, chloroplast genome, chromosomes and ploidy levels. Evolutionary implications. Gene structure, expression and regulation. RNAs

Plant biotechnology: Plants that have been genetically modified. Genetic modification techniques, GMO policies. Agricultural advances vs world hunger. Salt tolerance, drought tolerance, nutritional value, increased productivity, increased shelf life, pest resistant, herbicide resistant, less fertilizer, stress resistant, heat or cold tolerant, ornamental value.

Crop plants and agriculture at the cellular level: Cellular basis for crop plant value. Protein, lipid, carbohydrate, lignin content and modifications of a particular crop plant. Unique non-food plant products (cork, oils, medicines, wood, paper, cloth).

Plant subcellular features: Plant cytoskeleton, organelles, plant cell wall, ribosomes, vacuole, plastids

Model plants and their importance to cell biology: Arabidopsis, tobacco, corn, Chlamydomonas, tomato.

Plant cell biology tools: Advances in microscopy, genetic engineering, breeding, cladistics.

Plant pathogen interactions at the cellular level: Secondary plant metabolites, plant viruses, fungal pathogens, plant defenses, genetic engineering to improve plant defenses.

Writing assignment.

4-6 pages. First draft before April 4th (send electronically)

Plants in the news. Find original article, discuss why it is newsworthy (why was it picked for news). Read the article. Was it presented accurately and well? Summarize the findings. Was this an important study? How does it advance plant science, agriculture, technology, policy etc.? What should the researchers do next? Did you use any additional references (If so include full reference citation). Attach the article and the research paper.

Plant genetic engineering. Pick a plant that has had a gene genetically engineered. Describe it. How was it done? Why was this gene chosen to be modified or transferred into the plant? What does the gene do? How does it impact ...nutrition, growth qualities, stress mediation, economic improvement, yield, insect or herbicide resistance, or drug production etc.? Was this

a valuable gene change and why? What other genes would you suggest the researchers work on in this plant or in other plants? What is your opinion of the research? You can start with a news article and find the scientific article. Attach the article and the research paper.

Course grading scale

Cumulative Performance Grade

90% to 100%	A
86% - 89%	A-
82% - 85%	B+
78% - 81%	B
74% - 77%	B-
70% - 73%	C+
66% - 69%	C
62% - 65%	C-
58% - 61%	D+
54% - 57%	D
50%-53%	D-
49%---	F

Policy on makeup tests

No make-up tests will be given. If a quiz is missed for any reason, including excused absences, that quiz will be the single test score dropped in calculation of final grade. If an assignment is late, then one letter grade is deducted from assignment grade for each day late.

FAU Attendance Policy Statement:

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with

individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence. In this class, no make-up tests will be given. If a quiz is missed for any reason, including excused absences, that quiz will be the single score dropped in calculation of the final grade.

Classroom etiquette policy

University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions." *No recording of lectures is allowed including photographs.*

Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require reasonable accommodations due to a disability to properly execute coursework must register with the Office of Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses- Boca Raton, Davie, and Jupiter, however, disability services are available for students on all campuses.

Religious Accommodations

Students who wish to be excused from coursework, class activities or examinations must notify the instructor in advance of their intention to participate in religious observation and request an excused absence.

Honor Code policy statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty

is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For full details of the FAU Code of Academic Integrity, see University Regulation 4.001

[http://www.fau.edu/ctl/4.001 Code of Academic Integrity.pdf](http://www.fau.edu/ctl/4.001%20Code%20of%20Academic%20Integrity.pdf)

Tips to get and stay on track for a timely graduation

- 1) Learn how to navigate the “**MY FAU**” web portal. Familiarize yourself with features available through “**FAU Self-Service**” located within the “**Home**” tab as well as the features available in the “**Students**”, “**Money Matters!**” and “**Success Network**” tabs.
- 2) Use the **flight plans** available on the FAU website to build your own academic plan. The flight plans are suggested four-year course schedules leading to completion of the **Biology B.A.** or the **Biology B.S.** (blueprints for graduation within four years!). For Biology majors who wish to apply to a medical or professional program upon graduation, a suggested **Pre-Health** version of the Biology B.S. flight plan is also available.
- 3) Use the “**Departmental Schedule**” (not the “**Searchable Schedule**”) to see **all** courses available (by department) within a given semester when working to schedule your classes.
- 4) Use the **Degree Audit Reporting System (DARS)** to keep track of which requirements you still need to fulfill in order to graduate. When running your degree audit, you may audit your progress against the catalog year in which you first entered FAU (provided that you have maintained continuous enrollment) OR the current catalog year. You may also select alternate degree options to see if you are closer to completing one degree than another (e.g. compare the Biology B.S. with the Biology B.A.).

*****Please note the below excess credit hour policy. It is your responsibility to work with your academic advisor to minimize additional costs to you associated with the completion of excess credits.**

Credit Hour Policy: Excess Hours Surcharge

[Florida Statute 1009.286](#) defines “excess hours” as credit hours that exceed the completion requirements for a baccalaureate degree program at state universities. For students enrolling in a state university or a Florida State College System institution for the first time in or after the

fall 2009 semester, a tuition rate surcharge will be applied for excess hours. The surcharge is assessed only on the tuition portion of the semester hour cost, not on the fees. The amount of the surcharge and the allowable "excess hours" are determined by the initial term of entry as indicated in the catalog. For the complete Policy see

[http://www.fau.edu/academic/registrar/FAUcatalog/academics.php#excess.](http://www.fau.edu/academic/registrar/FAUcatalog/academics.php#excess)