



**HOS 6331, Spring, 2019, MW 11:45-1:40, Fifield Hall 2318**

---

**POSTHARVEST BIOLOGY**

---

**Instructor: Tie Liu  
Jeffrey Brecht  
Donald Huber  
Mark Ritenour  
Steve Sargent**



[TIELIU@UFL.EDU](mailto:TIELIU@UFL.EDU)  
[JKBRECHT@UFL.EDU](mailto:JKBRECHT@UFL.EDU)  
[DJHUBER@UFL.EDU](mailto:DJHUBER@UFL.EDU)  
[RITENOUR@UFL.EDU](mailto:RITENOUR@UFL.EDU)  
[SASA@UFL.EDU](mailto:SASA@UFL.EDU)



352-486-2638



**OFFICE HOURS**

TUESDAY AND WEDNESDAY  
2:30 – 4:30 PM.

Please make an appointment if you need to meet outside of these times.

---

Office – Room 1213 Fifield Hall;

Lab – Room 1206-1208

---

**GENERAL DESCRIPTION**

HOS 6331- Postharvest Biology

Pre-requisite: BOT-3503 or equivalent

Physiological, biochemical, and molecular aspects of senescence and ripening of harvested fruit and vegetative organs. Literature-based discussions of current theories and research on cellular processes relevant to the storage and quality maintenance of harvested plant organs. Offered Spring semester, odd-numbered years.

**COURSE SUBJECTIVES**

To familiarize students with the relationships between plant organ type, function, and the relevance of these attributes to predictive postharvest behavior and handling protocols.

To familiarize students with organ type and function, and of the cellular implications of these attributes as they influence performance in the postharvest environment.

To familiarize students with current literature in postharvest science, addressing critical thinking skills required to adequately judge and evaluate the relevance of scientific findings.

**OVERVIEW OF TOPICS**

Physiology, biochemistry, and molecular biology of fruit and vegetative senescence following harvest. Mechanisms contributing to senescence and deterioration phenomena including unscheduled forms of programmed cell death (PCD) associated with abiotic and biotic storage disorders. Membrane and cell wall metabolism, low-temperature injury, reactive oxygen species, apoptotic-driven death phenomena, ethylene biosynthesis, reception, and signal transduction, controlled-atmosphere storage, and postharvest pathology.

**TOPICS (Order and priority subject to change depending on student interests)**

<b>Week</b>	<b>Lecture Topics</b>	<b>Lecturer</b>
Week 1 Jan 7, 9	Overview of postharvest biology	Liu
Week 2 Jan 14, 16	Quality attributes and maturity/harvesting indices subjective vs. objective, destructive vs. nondestructive	Brecht Sargent
Week 3 Jan 23	Growth kinetics, sink activity, and consequences of maturity at time of harvest, single-sigmoid growth, double-sigmoid growth	Ritenour
Week 4-5 Jan 28, 30 Feb 4, 6	Membrane structural/functional changes in senescing organs Concepts of fluidity, microviscosity, lateral phase separation, membrane fusion. Membrane conformation: lamellar, hexagonal, hexagonal	Huber
Week 6 Feb 11, 13	Cell death processes in harvested plants and plant organs	Liu
Week 7 Feb 18, 20	Reactive oxygen species: signaling in senescence and aging	Liu
Week 8 Feb 25, 27	Postharvest physiology and molecular biology of vegetables and flower senescence <b>Mid-term exam</b>	Liu
Mar 4, 6	<b>Spring break</b>	
Week 9 Mar 11, 13	Potato tuber dormancy and postharvest sprout control	Liu
Week 10 Mar 18, 20	Ethylene biosynthesis and signal transduction Genetic modification of ethylene biosynthesis/perception	Liu
Week 11 Mar 25, 27	Fruit postharvest physiology Cell wall changes and fruit softening	Liu
Week 12 Apr 1, 3	Handling and storage of medicinal plants: Identification and postharvest processing	Liu
Week 13 Apr 8, 10	Chilling injury: terminology: tolerance versus sensitivity symptoms: primary, secondary control in the postharvest environment	Brecht
Week 14 Apr 15, 17	Fresh-cut fruits and vegetables, Fresh fruit flavor and aroma	Brecht

Week 15	Postharvest pathology: latency, quiescence	Ritenour
Apr 22, 24	infection progression and host responses, symptom expression	

### Texts

There are no required texts. Readings will focus on current postharvest-related literature. Selected readings will be distributed in class or provided via electronic means. Many of the assigned readings can be obtained on selected e-journal-based locations. Readings will be assigned at least one week in advance of scheduled in-class discussions.

Resource texts for individuals involved in postharvest research

*Advances in Post-Harvest Treatments and Fruit Quality and Safety*, Vázquez, M., Ramírez, J.A., eds., 2011. Nova Science Publishers, New York. Emphasizes technology over fundamental postharvest biology, but contains a number of excellent contributions from different authors. Currently about \$150.00.

*Annual Plant Reviews, Senescence Processes in Plants*, Susheng, G (ed.), 2007, Wiley-Blackwell. An excellent treatise of senescence biology, with emphasis on biochemical and molecular aspects but heavy bias (~80%) toward vegetative systems.

*Plant Cell Death Processes*, Larry Nooden (ed.), 2004, Elsevier (Academic Press). This is an excellent book addressing not only traditional concepts and views of senescence, ranging from cellular to organismic, but programmed cell death (PCD) as well.

*Postharvest Biology*, Kays, S., Paull, R., 2004, Exon Press. A wide-spectrum treatment of the discipline of postharvest science. Subjects range from very applied to very basic.

*Postharvest: An introduction to the physiology and handling of fruit, vegetables and ornamentals*, 5<sup>th</sup> Edition, R. Wills, B. McGlasson, D. Graham, D. Joyce (Authors), 2007, University of New South Wales Press. A very introductory-level textbook that might be helpful to those with limited exposure to postharvest science. Emphasizes fundamental biological and technological principles important in the storage of fruit, vegetative and floral organs. Also reasonably priced, about \$50.00!

*Postharvest Biology and Technology of Fruits, Vegetables, and Flowers*. G. Paliyath, D. Murr, A. Handa, S. Lurie (Eds.). 2008. Pricey (\$200.00), and individual chapters range from very good to equally bad, depending on the author (s).

*Postharvest Oxidative Stress in Horticultural Crops*, Hodges, D. (ed.), 2003, Food Products Press, NY. An excellent but highly focused text dealing with sources of and defenses against oxidative stress encountered in the postharvest environment.

*Biochemistry of Fruit Ripening*, Seymour and Taylor (eds.) 1993, Chapman and Hall, London. Although this has become dated, it remains an excellent source of introductory and historical

information on many topics of relevance to postharvest science. The book is fruit centric, with each chapter devoted to a different fruit type.

### **Course Readings**

These will be assigned as needs arise. **Please note that 20% of the course grade will be determined on the basis of student participation (participation in in-class discussions).** Students will be expected to have read all assigned readings **prior** to coverage of the material in class.

### **Student Evaluation**

Two midterm exams (20% each, scheduled at approximately 5 and 10 weeks into the semester), final exam (20%), class participation (20%), and an oral presentation/critique of a contemporary topic in postharvest science (20%). Additional details of this assignment are described below.

### **Exams**

The dates of the exams will be announced at least one week in advance. Letter grade assignments will depend on the performance of the class as a whole, but will be no stricter than  $\geq 90 = A$ ;  $\geq 80, < 90 = B$ , etc. Students missing scheduled exams due to excused absences will be permitted to perform make-up exams at a time and place arranged between the student and instructor.

### **Class Assignment and Oral Presentation**

At the start of the semester, each student will be required to select a single commodity (fruit, vegetative, floral) or closely related group of commodities that will provide the focal point for a 25 min presentation by the student. The presentation will be followed by a question/discussion session, with the student, with the assistance of the instructor, serving as discussion leader. Scheduling of the presentations will commence as early in the semester as possible. Topics will be selected by the student, but please confer with the instructor to avoid redundancy in topic selections. **Examples of acceptable topics:** postharvest issues as affected by organ morphology, developmental status at harvest, respiratory patterns after harvest, maturity indices, ethylene production/sensitivity, senescence patterns including programmed cell death, controlled-atmosphere storage and tolerance, pathogens, pigment changes, unique secondary metabolites, etc.

### **Attendance**

Class attendance is mandatory and will be used as one index of student participation and evaluation. Special circumstances necessitating absences must be arranged in advance or, in the event of an emergency, explained upon return.

### **Academic Honesty, Software Use, Services for Students with Disabilities, UF Counseling Services**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and

on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see:

### **Software Use:**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

### **Campus Resources**

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center*, 3190 Radio Road, 352-392-1575,

[www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/)

Counseling Services, Groups and Workshops, Outreach and Consultation  
Self-Help Library, Training Programs, Community Provider Database

- *Career Resource Center*, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)

### **Services for Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability-related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall , 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

Please provide the following information

Name: Gatorlink User Name:  
(Please write legibly)

Major and degree program (MS, Ph.D.) and research advisor:

Department:

Office number, phone, and e-mail address:

Research interests:

Physiology/biochemistry/molecular/developmental, etc. courses that you have taken:

Your class schedule: