

**ORH4932**  
**INTRODUCTION TO PLANT BIOTECHNOLOGY**  
**(3 credits)**

**I. COURSE AND INSTRUCTOR INFORMATION**

Course: ORH4932  
Instructor: Dr. Kevin Begcy  
Environmental Horticulture Department  
Office: 1535 Fifield Hall  
University of Florida, Gainesville, FL 32611  
Email: [kbegcy.padilla@ufl.edu](mailto:kbegcy.padilla@ufl.edu)  
Phone: (352) 273 4528  
Office Hours: Every Monday from 9:00am – 10:00am or  
by appointment. Please send me an e-mail.

**II. MEETING DAYS, TIMES AND LOCATION:**

M-W-F, 8th Period (3:00pm – 3:50pm). Online

**COVID-19.** Introduction to Plant Biotechnology is an in-person class offered every fall semester. However, due to the current COVID-19 pandemic situation **in Fall 2020, it will be offered fully online.**

**III. PREREQUISITES:** PLS3004C & AGR3303

**IV. COURSE DESCRIPTION**

Plant biotechnology is one of the most prolific and influential areas of the plant sciences. This upper level undergraduate course will be focused on modern biotechnological tools and applications that have resulted in great advances for agriculture and society.

**V. COURSE LEARNING OBJECTIVES**

The overall objective of this course is to provide an environment for students to develop critical thinking on plant biotechnological tools for plant improvement. Principles and applications of plant biotechnology from the cellular to whole-plant levels will be covered.

Upon completion of this course students will be able to:

- Describe regulation of gene expression and implications for plant transformation.
- Distinguish plant culture techniques and culture types.
- Evaluate several methods for stable and transient plant transformation.
- Design strategies for plant genetic manipulation against biotic and abiotic stressors.
- Hypothesize on strategies to increase plant yield and fruit/seed quality.

## **VI. COURSE STRATEGY**

- This course will focus on offering students the opportunity to learn biotechnological tools for plant improvement. A strong emphasis will be given to develop critical thinking ability to design experiments using biotechnological tools for plant improvement.
- Teaching lessons will include discussions of state-of-the-art literature on plant biotechnology, hands-on activities and problem sets.
- Active student participation in the class (questions and discussions) is highly encouraged and rewarded.

## **VII. TEXT AND MATERIALS**

### ***Textbook:***

Plant Biotechnology: The genetic manipulation of plants (Second Edition) by A. Slater, N Scott and M, Fowler.

Class material and additional reading material will be posted on Canvas weekly.

## **VIII. STUDENTS WITH DISABILITIES**

Students with disabilities are encouraged to contact Dr. Begcy for a confidential discussion of individual needs for academic accommodation. I will make every attempt to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in the course activities or meet course requirements. Students requesting classroom accommodation should also register with the Dean of Students Office. Phone number: 352-294-2273; email: [DSOCares@dso.ufl.edu](mailto:DSOCares@dso.ufl.edu)

## **IX. ACADEMIC HONESTY**

Students should value honesty and personal integrity.

The University of Florida requires all members of its community to be honest in all endeavors. Cheating, plagiarism, and any other form of academic dishonesty will not be tolerated. Students in violation of this policy will earn a zero for the assignment, be subject to disciplinary action, and may receive a failing grade for the course.

When students enroll at UF they commit themselves to honesty and integrity. As a result of completing the registration form at the University of Florida, every student has signed the following statement:

**“I understand the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that failure to comply with this commitment may result in disciplinary action up to and including expulsion from the university.”** Furthermore, on work submitted for credit by UF students, 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 to be assumed that all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

**X. GRADING**

Course grades will be based on 1000 points. There will be two partial midterms and a final exam. Quizzes will be given at the end of each week and require no more than 15 minutes to complete.

Missed exams/quizzes will count as a zero unless an arrangement to take a make-up is made **PRIOR** to the test date.

**Total:** 1000 points

**Midterm 1:** 250 points (**October 9<sup>th</sup>**)

**Midterm 2:** 250 points (**November 9<sup>th</sup>**)

**Final Exam:** 250 points (**December 9<sup>th</sup> – 1:30pm to 4:30pm**)

**Weekly Quizzes (every Friday):** 15 points each / 150 points total

**Homework:** 50 points

**Class participation (active interaction in class) and discussions: 50 points**

**The grading scale WILL NOT be adjusted or curved.**

**XI. GRADE DISTRIBUTION**

A	100.0 - 93.1%	A-	93.0 - 90.1%		
B+	90.0 - 86.1%	B	86.0 - 83.1%	B-	83.0 - 80.1%
C+	80.0 - 74.1%	C	74.0 - 72.1%	C-	72.0 - 70.1%
D+	70.0 - 64.1%	D	64.0 - 62.1%	D-	62.0 - 59.1%
E	59.0% or below				

**XII. PROGRAM**

<b>Modules</b>	<b>Learning Topic</b>
1	Plant genomes: the organization and expression of plant genes
2	Plant tissue culture
3	Techniques for plant transformation
4	Vectors for plant transformation
5	Strategies for plant improvement (CRISPR, RNAi, TALEN, OX)
6	Genetic manipulation of herbicide tolerance
7	Plant disease resistance
8	Reducing the effect of viral disease
9	Strategies for engineering stress tolerance
10	Improvement of crop yield and quality
11	Molecular farming
12	Science and society

**XIII. SCHEDULE**

Date		Topics	Learning Modules
Aug.	31 (M)	Introduction to the Class	
Sept.	2 (W)	History of Plant Biotechnology	
Sept.	4 (F)	DNA, Chromatin and Chromosome structure	Plant Genomes: The organization and expression of plant genes
Sept.	7 (M)	Holiday - No UF Classes	
Sept.	9 (W)	Regulation of Gene Expression	
Sept.	11 (F)	Fundamental skills in DNA sequence analysis - Hands on activity	
Sept.	14 (M)	Plant Tissue Culture	
Sept.	16 (W)	Plant Growth regulators	Plant Tissue Culture
Sept.	18 (F)	Plant regeneration	
Sept.	21 (M)	Primer Design - Hands-on Activity	
Sept.	23 (W)	Agrobacterium-mediated gene transfer	Techniques for Plant transformation
Sept.	25 (F)	Direct gene-transfer methods	
Sept.	28 (M)	Selectable markers and markers for screening	
Sept.	30 (W)	Principles of cloning, vectors, restriction enzymes	
Oct.	2 (F)	Homecoming - No Classes	Vectors for Plant Transformation
Oct.	5 (M)	Gateway cloning strategy	
Oct.	7 (W)	Vector design - Hands on activity	
Oct.	9 (F)	<b>Midterm I</b>	
Oct.	12 (M)	Overexpression	Strategies for plant improvement
Oct.	14 (W)	Gene stacking	
Oct.	16 (F)	RNAi	
Oct.	19 (M)	CRISPR	
Oct.	21 (W)	CRISPR design - Hands on activity	
Oct.	23 (F)	TALEN	
Oct.	26 (M)	Strategies for engineering herbicide tolerance: Glyphosate	The genetic Manipulation of Herbicide tolerance
Oct.	28 (W)	GM strategies for insect resistance	Plant Disease Resistance
Oct.	30 (F)	natural disease resistance pathway	
Nov.	2 (M)	Biotechnological approaches to disease resistance	
Nov.	4 (W)	VIGS - Virus Induced Gene Silencing	Reducing the effect of Viral disease
Nov.	6 (F)	Type of plant viruses	
Nov.	9 (M)	<b>Midterm II</b>	
Nov.	11 (W)	Stresses during reproductive development	Strategies for Engineering stress tolerance
Nov.	13 (F)	Targeted approaches to manipulating tolerance to stresses	
Nov.	16 (M)	Veterans Day - No UF Classes	
Nov.	18 (W)	Fruit ripening	The improvement of crop yield and quality
Nov.	20 (F)	Golden rice	

Nov. 23	(M)	Molecular farming of proteins	Molecular Farming
Nov. 25	(W)	Thanksgiving - No UF Classes	
Nov. 27	(F)	Thanksgiving - No UF Classes	
Nov. 30	(M)	Edible vaccines	Science and Society
Dec. 2	(W)	Review and Final Activities	
Dec. 9	(W)	<b>Final Exam</b>	

#### **XIV. EXPECTATIONS**

**Students are expected to spend 2-3 hours on the course material for EVERY hour spent in the classroom.** The reading assignment list will be posted during the first week of the class. It is subject to change as the course progresses. Students are expected to be courteous and respectful to their fellow students and not interfere with their learning. You are expected to be on time. Students are asked to stow their cell phones before entering the classroom.

#### **XV. ATTENDANCE AND MAKE-UP WORK**

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

#### **XVI. ONLINE COURSE EVALUATION PROCESS**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.ua.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.ua.ufl.edu/public-results/>.

#### **XVII. ACADEMIC HONESTY**

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:

<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

### **XVIII. 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.

### **XIX. 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, <https://disability.ufl.edu/>

### **XX. CAMPUS HELPING RESOURCES**

Students experiencing crises or personal problems that interfere with their general wellbeing 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](http://www.counseling.ufl.edu)  
Counseling Services  
Groups and Workshops  
Outreach and Consultation  
Self-Help Library  
Wellness Coaching

- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>.

Student Complaints:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>.
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>