PLS 4105
Genome Editing and Plant Biotechnology
(3 credits)

I. COURSE AND INSTRUCTOR INFORMATION

Course:	PLS 4105
Instructor:	Dr. Kevin Begcy
	Environmental Horticulture Department
Office:	1535 Fifield Hall
	University of Florida, Gainesville, FL 32611
Email:	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.

Teaching assistants: Dr. Taehoon Kim - taehoon.kim@ufl.edu
Divya Rana - divyarana@ufl.edu

II. MEETING DAYS, TIMES AND LOCATION:

M 8 - 9th Period (3:00pm – 4:55pm). **Room:** BLRB 154
W 8th Period (3:00pm – 3:50pm)

III. PREREQUISITES: PLS3004C & AGR3303 or by contacting the instructor

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. TEACHING PHILOSOPHY

Teaching is seeing as an activity confined only to classrooms. However, I see teaching as an action, that is part of our everyday activities, where interaction, discussion and critical thinking are inseparable aspects of the same concept. Thus, I do not teach in a one-way system but instead in an interactive environment. Hence, I teach concepts with examples, and I also stimulate students to think about cases where they can integrate the concepts learned. I believe that in this way, knowledge is easily incorporated by students. Furthermore, each student possesses a set of different strengths and needs. Thus, I think it is also part of the teaching process to observe students and focus on areas for improvement. I achieve this by exploring the best in each of them and fostering an environment for them to overcome their limitations. Independent of the topic I teach, I put all my passion and effort in teaching not only my subject of research but also old and new discoveries in order to stimulate my students to pursue their curiosity and ability to solve different problems and tasks.

VIII. TEXT AND MATERIALS

Textbook:

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

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

IX. 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

X. 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.

XI. 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. Grades from exams and quizzes will be returned within the next 3 subsequent classes.

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: 300 points **(October 7th)**

Midterm 2: 300 points **(November 20th)**

Final Exam: 200 points **(December 4th)**

Weekly Quizzes (every Monday): 10 points each / 150 points total

Class participation and discussions: 50 points

Rubrics

Performance Elements & Levels	**Inadequate (10 points)**	**Developing (20 points)**	**Accomplished (40 points)**	**Exemplary (50 points)**
Engagement & Active Participation	Student present a and rarely participates in class discussion;	Few contributions to class discussions; seldom volunteers	Proactively contributes to class discussion; asks questions	Proactively and regularly contributes to class discussion; initiates discussion

	fails to respond to direct questions	but responds to direct questions	and responds to direct questions	on issues related to class topic
Listening skills	Does not listen when others talk; interrupts or makes inappropriate comments	Does not listen carefully; comments are often nonresponsive to discussion	Listens and appropriately responds to the contributions of others	Listens without interrupting and incorporates and expands on the comments of other students
Relevance of contribution to topic under discussion	Contributions are off-topic or distract from discussion	Contributions are sometimes off-topic or distract from discussion	Contributions are always relevant	Contributions are relevant and promote deeper analysis of the topic
Preparation	Student is not adequately prepared; does not seem to have read the assigned material before class	Student has read the material but not closely, or has read only some of the material before class	Student has read and thought about the material before class	Student is consistently well prepared; sometimes adds relevant information beyond the assigned reading

The grading scale WILL NOT be adjusted or curved.

XII. 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				

XIII. PROGRAM

Modules	Learning Topic
1	Plant genomes: the organization and expression of plant genes
2	Techniques for plant transformation
3	Genome Editing and Genetic Engineering Strategies for plant improvement
4	Genome Editing and Genetic Engineering Strategies for plant improvement

XIV. SCHEDULE

Date			Topics	Learning Modules
Aug.	25	(M)	Introduction to the Class	Plant Genomes: The organization and expression of plant genes
Aug.	27	(W)	History of Plant Biotechnology	
Sept.	1	(M)	Holiday - No UF Classes	
Sept.	3	(W)	DNA, Chromatin and Chromosome structure	
Sept.	8	(M)	Regulation of Gene Expression	
Sept.	10	(W)	Plant Tissue Culture	
Sept.	15	(M)	Fundamental skills in DNA sequences analysis - Hands on activity	Techniques for Plant transformation
Sept.	17	(W)	Plant Growth regulators	
Sept.	22	(M)	Primer Design - Hands-on Activity	
Sept.	24	(W)	Direct gene-transfer methods	
Sept.	29	(M)	Agrobacterium-mediated gene transfer	
Oct.	1	(W)	Selectable markers and markers for screening	
Oct.	6	(M)	Midterm I	
Oct.	8	(W)	Principles of cloning, vectors, restriction enzymes	Genome Editing and Genetic Engineering Strategies for plant improvement
Oct.	13	(M)	Vector design - Hands on activity	
Oct.	15	(W)	Overexpression	
Oct.	20	(M)	Gene stacking	
Oct.	22	(W)	RNAi	
Oct.	27	(M)	CRISPR I	
Oct.	29	(W)	CRISPR I	
Nov.	3	(M)	CRISPR design - Hands on activity	
Nov.	5	(W)	CRISPR design - Hands on activity	
Nov.	10	(M)	TALEN	
Nov.	12	(W)	TALEN design - Hands on activity	
Nov.	17	(M)	Golden rice	Applications of Genome Editing and Genetic Engineering
Nov.	19	(W)	Midterm II	
Nov.	24	(M)	Thanksgiving - No UF Classes	
Nov.	26	(W)	Thanksgiving - No UF Classes	
Dec.	1	(M)	Oral presentations and Final activities	
Dec.	3	(W)		

XV. 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.

XVI. 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://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

XVII. 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.aa.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.aa.ufl.edu/public-results/.

XVIII. 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.

XIX.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.

XX. 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/

XXI. IN-CLASS RECORDING

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.
A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a

person injured by the publication and/or discipline under UF Regulation 4.040 Student

XXII. 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.

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.
University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.

On-Line Students Complaints: View the Distance Learning Student Complaint Process.