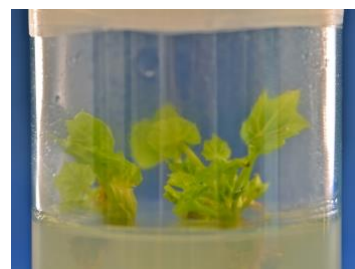# MICROPROPAGATION OF HORTICULTURAL CROPS
ADVANCED MICROPROPAGATION

PLS 4242C | PLS 5241C

4 CREDITS

FALL 2025

INSTRUCTOR:

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COURSE COMMUNICATIONS: *General questions should be posted to the course's discussion board. Private questions should be sent to the instructor through the course management system. Office hours with instructor and/or teaching assistants by appointment.*

COURSE WEBSITE: *http://lss.at.ufl.edu*

All course PowerPoint lectures, reading materials and laboratory handouts can be accessed through Canvas at the e-Learning website (lss.at.ufl.edu). Click on the e-Learning Login icon and enter your GatorLink username and password. Students must have an active GatorLink ID to access e-Learning. Students who do not have GatorLink IDs, who cannot remember their GatorLink login information, who experience difficulties with Canvas, or whose IDs do not work, should contact the GatorLink website http://gatorlink.ufl.edu or the UF Computing Help Desk for assistance: Hub 132 or 392-HELP.

COURSE FORMAT:

- One 50-minute lectures weekly: 9:35 – 10:25 am (Period 3) – Monday, in Building 1200 (PSF), Room 5
- One weekly three-hour laboratory session held in Room 111, Building 68 on Tuesday 12:50 – 3:50 pm (Period 6 – 8).
- Lab address: 2043 IFAS Research Drive, south of Fifield Hall on Ballpark Way/IFAS Research Drive, turn east ½ - ¾ of way between Archer Rd and Hull Rd and follow road south to red brick building

RECOMMENDED TEXT:

Trigiano, R.N. and D.J. Gray. 2011. Plant Tissue Culture, Development, and Biotechnology. CRC Press.

ADDITIONAL RESOURCES: *Additional reading material will be provided.*

COURSE DESCRIPTION: The principles and practices involved in the micropropagation of horticultural crops, including plant tissue culture techniques, laboratory equipment and procedures, and clonal propagation of horticultural crops. The course consists of lectures, laboratories exercises using selected horticultural plants as examples, and a term project. For graduate students, an additional project includes a review paper on any topic related to micropropagation.

PREREQUISITE KNOWLEDGE AND SKILLS: Plant Propagation (PLS3223L or PLS5222C). Course prerequisites can be substituted by similar coursework and/or sufficient knowledge in plant biology and horticulture with focus on propagation.

PURPOSE OF COURSE: The purpose of Micropropagation of Horticultural Crops is to provide students with general knowledge on the principles and practices of micropropagation of plants. This includes exposing students to basic knowledge on plant tissue culture techniques, as well as their application through hands-on exercises in laboratory. We aim to provide students with a broad perspective and greater appreciation for in vitro plant propagation, as well as to elucidate its potential and value as a commercial technique for the production of horticultural crops.

COURSE GOALS AND/OR OBJECTIVES: *By the end of this course, students will:*
- Understand the concepts behind tissue culture techniques and micropropagation;
- Understand how a micropropagation laboratory is designed and organized
- Appreciate the complexity of techniques and tools used for micropropagation;
- Explain the different stages involved in the process of micropropagation;
- Design and implement a business plan for a commercial micropropagation laboratory;
- Analyze and interpret results from a laboratory experiment involving micropropagation;
- Write a report and present the results of a laboratory experiment involving micropropagation

TEACHING PHILOSOPHY: I am a strong advocate of developing creative and critical thinking in students. I perceive teaching as stimulating students to think and develop skills to analyze and solve problems, in order to make timely and sound decisions independently. Students should be exposed to different practical challenges to better assimilate and retain the basic concepts. I make a concerted effort to assure active participation and interaction in the classroom, which helps me to give meaning and to concretize abstractions, thus inducing additional creative and critical thoughts. I welcome and encourage questions and discussions.

INSTRUCTIONAL METHODS: My basic approach to teaching is appropriately adapted to each subject matter. After introducing the basic concepts to the students, I encourage discussion to critically evaluate those concepts and guide students towards a common conclusion. This type of interaction significantly enhances the learning

process, allowing students to grasp a concept and move on to the next level. I use practical and real-life examples as essential elements in my lectures to stimulate critical thinking. My style and methods of teaching are very open. I like to expose concepts, ideas, examples and other material using a combination of discussion, PowerPoint presentations, laboratory exercises, and videos.

LEARNING MODULES:

Module	Topic	Textbook Chapter(s)
1, 2, 3	Introduction, Plant Tissue Culture Applications and History	8, 16, 31, 33, 38, 39, 40, 41, 45
4	Establishment of Sterile Cultures; Sterile Technique and Equipment	2, 3
5, 11	Developmental Pathways: Overview and Node Culture	7, 8, 43
6	Culture Indexing; Antibiotic Use	17, 18
7, 8, 9, 10	Culture Media: Selection and Preparation	2, 3, 4
11, 12, 13	Developmental Pathways: Shoot Culture Direct Shoot Organogenesis	12, 19, 20
14	Indirect Shoot Organogenesis	19, 20
15	Somatic Embryogenesis	22, 23
16	Factors affecting response in vitro	4
17	Developmental and Physiological Problems	4
18	Automation & Bioreactors	Papers
19	Cryopreservation	Papers
20	Protoplast culture	26, 27, 28

LABORATORY REPORTS:

Three laboratory reports based on data generated from experiments will be submitted in the format of a scientific paper. Report writing guidelines will be provided. Submission deadlines for these reports will be dependent on plant culture responses. A detailed grading rubric for this assignment will be provided in Canvas.

TERM PROJECT:

Students will be assigned to groups for a term project. The goal of the term project is to combine elements of the course with leadership skills. Instructions and details will be provided in class.

COURSE SCHEDULE FALL 2025:

Week	Dates	Module/Topic	Lab Sessions
1	Lecture – Aug 25 Lab – Aug 26	Instructor student introductions 1 – Course Introduction 2 – History 3 – Advantages and Limitations	Lab 1 – Laboratory layout, equipment, materials, safety, sterile technique, shoot transfer, seed germination
2*	No Lecture – Sep 1 – Labor day Lab – Sep 2	No Lecture Labor Day Holiday	Lab 2 – Culture transfer Clerodendrum
3	Lecture – Sep 8 Lab – Sep 9	4 – Culture Establishment 5 – Micropropagation Stages 6 – Culture Indexing	Lab 3 – Potato microtuberization
4	Lecture – Sep 15 Lab – Sep 16	7 – Culture Medium 8 – PGRs 9 – Additional info	Lab 4 – Contamination; Culture Indexing
5	Lecture – Sep 22 Lab – Sep 23	10 – Medium preparation	Lab 5 – Meristem culture (carnation) Evaluation Labs 1-4; Data collection for report
6	Lecture – Sep 29 Lab – Sep 30	11 – Developmental Pathways 12 – Shoot Culture	Lab 6 – Cytokinin optimization Clerodendrum Lab Report 1
7	Lecture – Oct 6 Lab – Oct 7	13 – Organogenesis 14 – Indirect Organogenesis	Lab 7 – Cauliflower/broccoli floral explants

8	Lecture – Oct 13	15 – Somatic Embryogenesis	Lab 8 – Potato data collection
	Lab – Oct 14		Lab 9 – Orchardgrass SE
9	Lecture – Oct 20	16 – Factors Affecting Response In Vitro	Lab 10 – Rooting (Clerodendrum cultures from Lab 6); cytokinin data collection
	Lab – Oct 21		Lab Report 2
10	Lecture – Oct 27	17 – Developmental and Physiological Problems	Lab 11 – Sundew/Venus fly trap
	Lab – Oct 28		
11	Lecture – Nov 3	18 – Automation and Bioreactors	Lab 12 – Orchid seed germination
	Lab – Nov 4		
12*	Lecture – Nov 10	19 – Cryopreservation	No Lab Veteran's Day Holiday
	No Lab – Nov 11 – Veteran's Day		
13	Lecture – Nov 17	20 – Commercial Micropropagation	Lab 13 – Evaluation of labs 1-9; Cauliflower data collection
	Lab – Nov 18		Lab report 3
14*	Nov 24-28	No classes – Thanksgiving	No Lab – Thanksgiving
15	Lecture – Dec 1	Course review – discussion of lectures	Lab 14 – Evaluation of labs 10-14
	Lab – Dec 2		
16	Dec 3	Project Presentations Classes end	Lab 15 – Lab cleanup; Final Lab Evaluations, Discussion, Reflection

DISCLAIMER: *The syllabus and course schedule are subject to change as needed.* Such changes are not unusual and should be expected. Changes will be communicated clearly and in advance.

*HOLIDAYS 2025:

- Labor Day: September 1
- Homecoming: October 17
- Veteran's Day: November 11
- Thanksgiving: November 27

GRADING POLICIES:

PLS 4242C

Assignment	Grade Percentage
Laboratory Reports (3)	25%
Written Term Project	25%
Project Presentation	25%
Project Group Peer-Evaluation	25%
Total	100%

PLS 5241C

Assignment	Grade Percentage
Laboratory Report	20%
Written Term Project	20%
Project Presentation	20%
Project Group Peer-Evaluation	20%
Review Project	20%
Total	100%

GRADING SCALE: For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Letter Grade	Grade Points	Percent
A	4.0	94 – 100%
A-	3.67	90 – 93.99%
B+	3.33	86 – 89.99%
B	3.0	83 – 85.99%
B-	2.67	80 – 82.99%
C+	2.33	76 – 79.99%
C	2.0	73 – 75.99%
C-	1.67	70 – 72.99%
D+	1.33	66 – 69.99%
D	1.0	63 – 65.99%
D-	0.67	60 – 62.99%
E	0.33	< 59.99%

RULES OF BEHAVIOR DURING LECTURE AND LABORATORY PERIODS:

The rules of behavior aim to maintain a level of civility and respect among students and instructors:

1. Please, arrive earlier, at least 5 minutes before lecture/laboratory starts. Arriving late is disruptive to other students and you may miss important concepts explained at the start of the lecture/lab.

2. Please avoid talking during the lecture.

3. Cell phones must be turned off and put away during lectures and laboratory exercises. Focus is essential in this course.

COURSE POLICIES, CLASS ATTENDANCE AND MAKE-UP POLICY:

This is a live course with weekly lectures, assignments, and laboratory activities. Lectures are presented in PowerPoint format. Videos and reading material complement the lectures. All course materials are available via the CANVAS course website. See below for Canvas technology requirements.

Students are expected to attend all lectures and laboratory sessions and arrive on time. Students are also expected to login to the course website at least once a week and complete all activities listed for each particular module, following the course schedule.

Requirements for class attendance, absences, and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Class attendance is expected. Each unexcused absence will result in a 10-point reduction in the final grade. Excused absences are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/) and require appropriate documentation.

Lab attendance is also expected, and no make-ups will be available, since laboratory exercises require your physical presence for hands-on activities.

PLEASE NOTICE: Late essay response papers will not be accepted. A makeup midterm and makeup final exam will be provided for students who miss either exam due to extreme, documented circumstances. Students should arrange with the instructor for makeup material, and the student will receive one week to prepare for any makeup assignment, if circumstances allow it.

CANVAS TECHNOLOGY REQUIREMENTS (FALL 2021):

Computers, Internet, and Web browsers: Canvas runs on Windows, Mac, Linux, iOS, Android, or any other device with a modern web browser. It is recommended to use a computer less than five years old with at least 1GB of RAM. It is recommended to have a minimum internet speed of 512kbps. It is **strongly recommended** to not use a wireless connection, phone, tablet, or notepad for critical course tasks such as exams and discussions.

Canvas currently supports the following browsers: Chrome, Safari, Firefox, Edge. Canvas supports the last two versions of most browsers. It is **highly recommended** updating to the newest version of whatever browser you are using. Note that your computer's operating system may affect browser function. Failure to use one of these browsers will cause problems.

For more information on approved computers and browsers please visit: https://community.canvaslms.com/t5/canvas-basics-guide/what-are-the-browser-and-computer-requirements-for-canvas/ta-p/66   on this web page there is an area titled "Is My Browser Up To Date?" Use it to check each computer and browser you may use in this course. There is another important area on "Browser Privacy Settings." Read the section(s) for any browser intended for use. For example, **note that**: in browsers such as Safari, insecure content will never be displayed in the browser. Return to the page to check for updates on technology issues in Canvas.

If you encounter technical difficulties in this course, contact the UF computing help desk right away to troubleshoot. https://helpdesk.ufl.edu/ or (352) 392-help. If the problem cannot be fixed immediately, notify your instructor, and **provide them with the help desk ticket number**.

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 Honor Code and Student Conduct Code.

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES:
Students requesting accommodation for disabilities must first register with the Dean of

Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive; therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

NETIQUETTE: COMMUNICATION COURTESY: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf

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.

GETTING HELP:

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.

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.

ONLINE COURSE EVALUATION PROCESS:

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/. You may complete the evaluation as soon as it becomes available. The results will not be available to your instructor until the final exam period has passed.