

PLP4222C VIRAL PATHOGENS OF PLANTS

SPRING 2025

3 credit hours

Instructor:

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Class Location: 2306 Fifield Hall and online via Zoom

Only lectures and discussions can be attended via Zoom. Labs should be attended in-person.

Class Times: 7-week module: January 27 to March 14, 2025

Lectures: M, T, R (9:35 am – 10:25 am)

Labs/Discussions/Quizzes/Lectures: W, F (9:35 am - 11:30 am)

Join Zoom Meeting

<https://ufl.zoom.us/j/95952143816?pwd=Lt1dfdHZ06V0hV7NBG9FcTodLHUMDa.1>

TBE

Course Materials Access:

Course website in Canvas at <https://elearning.ufl.edu>

Office Hours:

By appointment, in-person, via Zoom, or over the phone

Course Overview:

The course discusses most important principles and concepts related to viruses, with the main focus on viruses that infect plants. Those include virus classification, architecture, genome

organization, replication, movement, cytopathology of virus infections, virus-host interactions, transmission, epidemiology, and evolution. The course also discusses principals of virus diagnosis and control measures. The course includes lectures, discussions, and laboratory sessions. Discussions will focus on research articles and virus case studies, which aim to advance the students' knowledge in plant virology. Wet laboratories are designed to give students hands-on experience and improve their understanding of the fundamental concepts being discussed in the course.

This course is co-taught with PLP6223C “Viral Pathogens of Plants”. Grading for undergraduate students will rely more heavily on exams and class participation than for graduate students. Undergraduate students will not be expected to have the same depth of understanding of the information and concepts as graduate students, and this will be reflected by more rigorous exams and quizzes for graduate students relative to the undergraduate students enrolled in the course. Undergraduate students will not be expected to complete the “Virus Case Study” assignment, which is required for graduate students.

Course Objectives: through this course, students will:

1. Become familiar with most important principles and concepts related to viruses that infect plants;
2. Become familiar with the fundamental characteristics and biology of most economically important plant viruses;
3. Learn the experimental procedures and methods that are used in the plant virology research and plant virus diagnostics;
4. Improve professional skills, including skills in developing a scientific idea as well as in critical reading of scientific literature and presentation skills.

Prerequisites: Introductory courses in Genetics and Biochemistry/Molecular Biology. Prior completion of introductory courses in Plant Biology and Plant Pathology is desired.

Course Schedule of Topics and Assignments:

Week No.	Date	Class type	Topic
1 M	01/27/25	Lecture 1	Course Introduction
1 T	01/28/25	Lecture 2	Introduction to Viruses
1 W	01/29/25	No class meeting: work remotely on your reading assignment	Are viruses alive? Required reading: Moreira and Lopez-Garcia (2009); Forterre (2016)

			Video with Dr. Vincent Racaniello https://youtu.be/QD7YLLyh_HE
1 R	01/30/25	Lecture 3	Virus Classification
1 F	01/31/25	Discussion	Are Viruses Alive? Discussion of the selected articles Moreira and Lopez-Garcia (2009); Forterre (2016)
2 M	02/03/25	Lecture 4	Architecture of Viruses
2 T	02/04/25	Lecture 5	Virus Infection Cycle
2 W	02/05/25	Lecture 6	Outcomes of Plant Viral Infections
2 R	02/06/25	Lecture 7	Genome Organization and Expression I
2 F	02/07/25	Quiz 1 and Lecture 8	Genome Organization and Expression II
3 M	02/10/25	Lecture 9	Viral Cycle of (+) RNA Viruses
3 T	02/11/25	Lecture 10	(+) RNA viruses of plants; Expression of viral genomes I
3 W	02/12/25	Lab exercises	Electron microscopy of viruses; sample preparation
3 R	02/13/25	Lecture 11	(+) RNA viruses of plants; Expression of viral genomes II
3 F	02/14/25	Quiz 2 and Lecture 12	Viral Cycle of (-) RNA and dsRNA Viruses of plants
4 M	02/17/25	Lecture 13	Viral Cycle of plant DNA Viruses
4 T	02/18/25	Review	
4 W	02/19/25	Lab Exercises	Electron Microscopy of Virus Samples; Visualization
4 R	02/20/25	Exam I (no class meeting)	Take-home exam: the exam questions will be provided on 2/18/25; your answers are due by 02/24/25 at 11:59 pm
4 F	02/21/25	Lectures 14-15	Virus Movement within plant hosts: cell-to-cell and long-distance movement
	02/24/25	Lecture 16	Virus Interactions with Plant Immunity
5 T	02/25/25	Lecture 17	RNA Silencing I
5 W	02/26/25	5 M	Virus inoculation: mechanical inoculation; <i>Agrobacterium</i> -mediated infiltration
5 R	02/27/25	Lecture 18	RNA Silencing II
5 F	02/28/25	Quiz 3 and Lecture 19	Transmission of Plant Viruses
6 M	03/03/25	Lecture 20	Viroids
6 T	03/04/25	Lecture 21	Satellite Viruses and Satellite RNAs
6 W	03/05/25	Quiz 4 and Lab exercises	Observations of the outcomes of virus inoculations (viral symptoms and movement) RNA silencing demonstration; Inoculation of plants with silencing inducers
6 R	03/06/25	Lecture 22	Virus Evolution

6 F	03/07/25	Lectures 23 and 24	Diagnosis I and II
7 M	03/10/25	Lecture 25 and Lab exercises	Plant viruses in agriculture and industry RNA silencing demonstration; Observations of RNA silencing induction
7 T	03/11/25	Graduate Student presentations	Virus Case Study
7 W	03/12/25	Lab exercises and Graduate Student presentations	Observations of RNA silencing progression Virus detection by ELISA Virus Case Study
7 R	03/13/25	Graduate Student presentations	Virus Case Study
7 F	03/14/25	Exam II	Final exam (in-class)

References for the Supplementary Reading Materials (these articles are provided as pdf files on the course website in Canvas):

Moreira D, López-García P. Ten reasons to exclude viruses from the tree of life. *Nature Reviews Microbiology*. 2009 Apr;7(4):306-11.

Forterre P. To be or not to be alive: How recent discoveries challenge the traditional definitions of viruses and life. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*. 2016 Oct 1;59:100-8.

Required and Recommended Textbooks:

Although there is no required textbook, students are expected to read all the reading materials provided by the instructor, which will include review and research articles. Those will be provided in electronic format. Among those materials will be papers selected specifically for in class discussions that students are expected to study in details in order to actively participate in discussions.

Recommended textbooks:

Hull R. *Comparative plant virology*. Academic press; 2009 Mar 10.

Hull R. *Plant virology*. Academic press; 2013 Oct 31.

Grading:

Exams – Exam I (30% of student's grade); Exam II (30% of grade)

Quizzes – 15%

Participation in class discussions and labs (25% of grade)

Exams: There will be a mid-term open-book take-home exam (Exam I) and an in-class final exam (Exam II). Students will be given a few days to complete the take-home exam (see the course schedule above). In brief, there will be no in-class meeting on the date when the take-home exam questions are distributed. The students may use this time slot plus an additional time necessary to work on the exam. This provides an opportunity for the students to select the best time among their busy schedules to complete the exam.

Quizzes: There will be four in-class quizzes. Each quiz will take about 10-15 minutes to complete. Only the three quizzes with highest grades will be used toward the final course grade. These quizzes are designed to help students stay current with the course materials.

Participation in class discussions and labs: Students are expected to participate in discussions during discussion sections and class lectures and labs by answering questions from the instructor and volunteering to ask their own questions related to the course material. Students should demonstrate an understanding of the concepts and ability to integrate the information presented. Grading will be based on demonstration of understanding of the concepts, preparedness for the discussions, and frequency of participation.

Grading Scale:

92-100% A
90-91% A-
86-89% B+
83-85% B
80-82% B-
76-79% C+
73-75% C
70-72% C-
66-69% D+
63-65% D
60-62% D-
Below 60% E

Detailed and up-to-date information on UF grades and grading policies can be found at

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Attendance and Make-up Policy:

Students are expected to attend all course lectures, discussions, and labs as well as complete required assignments on time. Students should arrive to the class on time. No cell phone use is

allowed in the class. Along with the fact that these are firm requirements for participating in the course, the ability to fulfill these expectations reflects your professional characteristics. If you are unable to attend a class due to illness or an emergency, you must notify the instructor as soon as possible, preferably prior to the scheduled class. If you miss an exam for a valid and documented reason, a make-up exam will be scheduled with permission from the instructor. These requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Accommodations 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. The respective students should first register with the Disability Resource Center at 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/ and provide appropriate documentation.

On-line course evaluation:

According to the UF Policy on Course Syllabi, “students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.”

Materials and supplies fees:

\$35; the fees are used to purchase materials for the laboratory exercises.

Academic Honesty

As a student enrolled at the UF, you committed yourself to the highest standards of honesty and integrity required by the honor code. You are expected to be consistent with this commitment. The following is the UF Honor 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.” As it is stated by the UF student honor code, “all work submitted for credit by students at the university, the following pledge is either required or implied: On my honor, I have neither given nor received unauthorized aid in doing this assignment. The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Students should report any condition that

facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council or Student Conduct and Conflict Resolution in the Dean of Students Office.” (Source: 2013-2014 Undergraduate Catalog).

It is expected that you will complete all work independently unless the assignment is designed as a group project as explicitly indicated by the instructor.

This policy will be firmly upheld at all times during this course.

For more information regarding academic honesty and student responsibilities, please see:

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

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 Helping Resources

The university’s counseling resources are available for students experiencing personal problems that interfere with their general well-being and/or academic performance. The Counseling & Wellness Center provides confidential counseling services at no cost for students that are currently enrolled with the university.

• University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,
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, 352-392-1601, www.crc.ufl.edu/

The instructor reserves the right to modify information provided in the syllabus. Any modifications will be communicated to the enrolled students via class announcements in advance.

