

PLP 6291: DISEASE DIAGNOSIS

3 CREDITS (GRADED), FALL 2015, ONLINE AND IN-LAB

"The phytopathologists are the trained plant doctors, the 'medicine men of agriculture', whose final goal is successfully to prevent or control plant or crop diseases." *F. D. Heald. 1943. Introduction to Plant Pathology. New York: McGraw-Hill Book Company, p. 1.*

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OFFICE HOURS: Office hours are Monday-Friday 9-4 by appointment only; appointments must be requested by email (clharmon@ufl.edu) at least 48 hours in advance. Office hours may take place at Building 1291 (the Plant Diagnostic Center), by phone, or virtually via Lync, Skype, or Zoom. Course-related communications will be addressed once per day, between 9 am and 4 pm eastern.

COURSE WEBSITE: <http://lss.at.ufl.edu>

COURSE COMMUNICATIONS: Questions and discussion are encouraged; the majority of questions should be raised on the class discussion board when relevant to allow for group comment and learning. Private questions should be sent to the instructor at clharmon@ufl.edu.

REQUIRED TEXT: There are no required texts, but see below for additional resources that are recommended.

ADDITIONAL RESOURCES: Required readings will be provided via the course website. Recommended texts will be available for reference during office hours: APS Compendia; current Vegetable Production Handbook for Florida, Eds. Santos et al.; Plant Pathology, Agrios et al, 5th edition or later; Essential Plant Pathology, Schumann and D'Arcy, 2nd Edition.

COURSE DESCRIPTION: The goal of plant disease diagnosis is to identify the causal agent of plant disease through a process of deductive reasoning and relevant tests. Plant disease management practices rely on accurate and timely diagnosis. This course is a general overview of some of the many methods, strategies, and tests used in the diagnosis of plant diseases. This course is not intended as a primer in plant pathology, although we will discuss plant-pathogen

interactions and organismal biology as they apply to specific cases. Over the course of the semester, students will utilize their knowledge of plant pathogen organismal biology, chemistry, and critical thinking to develop and test hypotheses during the diagnosis of plant diseases.

PREREQUISITE KNOWLEDGE AND SKILLS: Basic knowledge of plant horticulture will be valuable in the interpretation of management reported by the clientele. An introductory course in plant pathology is strongly advised, but not required. Plant pathogen organismal courses in bacteriology, fungal plant pathogens, and virology are required. Additionally, students should have a working knowledge of the distance-education tools used to disseminate the course content; at a minimum, students will need to be able to navigate the course website and materials, take the quizzes and final exam, review any lectures, link to online resources, use and respond to email, and produce and upload written content to the course website.

PURPOSE OF COURSE: The purpose of this course is to advance students' knowledge of diagnostic methods for plant diseases, incorporating pathogen biology, chemistry, and critical thinking. Students will learn the process, techniques, and technology utilized in diagnosis of diseases. Plant diseases will be emphasized in this techniques-based course, accompanied by human/animal disease examples.

COURSE GOALS AND/OR OBJECTIVES: Students will learn the basic theory behind techniques used in the process of disease diagnosis, then will apply theory to practice. This course is a hands-on laboratory-based course, and students will develop proficiency in each technique. Although basic troubleshooting skills for each technique will be discussed, students who wish to develop molecular detection and manipulation techniques and tools as part of their research are encouraged to take the appropriate courses for those techniques (ie. HOS4313C, Laboratory Methods in Plant Molecular Biology or HOS 6932 - Molecular Markers in Plant Breeding).

TEACHING PHILOSOPHY: I see opportunity in meshing my extension and research programs with my teaching duties. The courses I teach tend towards those with practical applications. Experiential learning derived from participation in extension projects imbues coursework with real-world examples. There is additional potential for extension impact within the span of the semester, as the students apply their knowledge to solving the field and laboratory problems of extension clientele.

I encourage students to set high expectations for themselves, with a safety net of being able to work through a problem with me or their fellow students. Since my courses tend towards the applied, I employ practicum-style projects and examinations so students have an opportunity to demonstrate they have accomplished the course objectives over the course of the semester. When practical, I assign group projects to encourage students to gain additional perspectives for problem-solving. My assessment methods include quizzes, short papers, projects, and

presentations so students have multiple avenues for polishing their communication skills. I have found that the best way to learn something is to teach it to others, so I encourage peer-to-peer learning and rubric-based evaluation opportunities. I strive to provide prompt evaluation and return grades quickly so students can incorporate the feedback.

INSTRUCTIONAL METHODS: This course is online and in-lab. It is structured as a series of modules with assessments built in. I utilize graded quizzes (at the end of a lecture, meant to direct students' attention to important topics and to give me an idea of areas that may need more instruction) and graded projects and papers (at the end of a unit, to assess students' retention and comprehension of important topics). I also assign papers to read for additional information, projects to complete to demonstrate problem-solving, and discussion boards to gauge participation.

COURSE POLICIES:

ATTENDANCE POLICY: Your registration in this course indicates your willingness to participate fully. As this is both an online and a lab-based course, you may progress through the online modules at your own pace, within the week-long time frame of the assigned modules. The laboratory portion will consist of three 3-hour blocks of time on consecutive days to allow students to begin and complete techniques. Withdrawal from this course must be during the normal add/drop window designated by UF.

QUIZ/EXAM POLICY: Quizzes and projects are intended to provide the student with opportunities to excel. Grades will be based on timed open-book quizzes, projects, participation in discussion threads, diagnosis of an unknown sample, and the final timed, open-book exam. The final exam is cumulative and occurs the last week of classes. I will drop your lowest quiz grade when calculating your overall grade. You may inquire about quiz and exam grades only for 48 hours following the return of grades for that quiz or exam; feedback should be pertinent to the learning objectives at that time.

MAKE-UP POLICY: Quizzes, lab exercises, and projects have a window in which they must be completed. Emergencies do happen, and if they will impact your participation in any graded opportunity, you must contact the instructor by email at least 24 hours **PRIOR** to the quiz/exam/project due date and time. Make-up quizzes may be allowed at the discretion of the instructor in such circumstances. Power outages, computer problems, and software glitches may occur, even under the best of circumstances. In order to allow yourself plenty of time to work around these unforeseen technological issues, do not wait until the last minute to complete assignments or assessments at the end of each module! There is no make-up for the final exam, but you may take the exam early, with the instructor's permission. Consult the instructor at least one week prior to the scheduled exam to request this option.

ASSIGNMENT POLICY: Assigned readings are for your edification and to expand your knowledge base. Major topics from assigned readings may be addressed in quizzes and the final exam. Assignment/quiz/exam due dates and times are firm; plan accordingly. Rare exceptions may be made in the event of an emergency, see the make-up policy above.

COURSE TECHNOLOGY: The material for this course will be delivered through the online resource, Canvas. The course and support and resources are all available at <https://lss.at.ufl.edu/>. Registration in this course indicates you have basic knowledge in computer use and online technology to enable your full participation in the course. Since we are using an electronic resource, your registration indicates you understand that things such as bandwidth, power, etc. are integral to making it work, and you will plan accordingly.

COURSE SUPPLIES: Your registration in this course indicates your agreement to arrive on-time for your scheduled laboratory exercises, dressed appropriately for laboratory work (closed-toe shoes, long hair pulled back, etc.). A lab coat and appropriate personal protection equipment (safety glasses, gloves, etc.) will be provided. You will be required to keep a lab notebook; a standard lined composition book will accommodate your need to take notes about samples and techniques.

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>.

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.

NETIQUETTE: COMMUNICATION COURTESY: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. [Describe what is expected and what will occur as a result of improper behavior]

<http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf>

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. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

GETTING HELP:

For issues with technical difficulties for E-learning in Canvas, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

** Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at <http://www.distance.ufl.edu/getting-help> for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit <http://www.distance.ufl.edu/student-complaints> to submit a complaint.

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See <http://distance.ufl.edu/student-complaints> for more details.

GRADING POLICIES:

Assignment	Percentage
Quizzes/short assignments	40%
Laboratory notebook	10%
Unknown sample	20%
Discussion participation during laboratory exercises	5%
Final exam	25%

GRADING SCALE: This course will be graded using letter grades, to include minus grades.

A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73

Assignments are weighted by the number of points assigned to them. Final grades are calculated as total points earned out of total points possible for the course assignments. I round one decimal point, so an 83.5 becomes an 84, but an 84.4 becomes an 84.

EXTRA CREDIT: Development of a short video or PowerPoint on a specific topic related to disease diagnosis may be considered for an extra credit project. The objective of such a project will be to enrich the course material with an explanation of a specific concept (e.g., how to prepare a microscope sample or how a specific host-pathogen system is diagnosed). The project must be outlined and proposed to the instructor, approved by the instructor, and the final product submitted before the last week of the course. Projects will be considered the equivalent of a quiz, and will be added to the final points earned. The number of points earned for a specific project will be at the discretion of the instructor, based on the quality of the finished product.

COURSE SCHEDULE/TOPICS:

FINAL EXAM: December 14

This course will be taught as a series of modules. You will need to complete the assessment at the end of each module before you can open a new module. Modules will be open for one week, from Monday at 12:00am until Sunday at 11:59pm. The final exam will be open for a specific 1.5 hour window of time on the exam day; you may start the exam at any point during the day, and the clock will count down for 90 minutes. The exam will close at 7 pm, regardless of when you start the exam (so start no later than 5:30 pm). These timelines will be detailed during the first class meeting.

Part I. Critical thinking skills used in diagnosis

Critical thinking

The diagnostic process – triage to diagnosis

Koch's Postulates

Biotic vs. abiotic plant problems

Making use of keys and references

Basic lab technique review: pipetting, calculations for solutions and dilutions, lab notebooks, lab safety

Begin triage and characterization of unknown sample

PART II. Storage of Pathogens/Samples

Digital records

Extracts, extractions, and solutions

Solid, liquid cultures

Dry and glycerol (frozen)

Part III. Light Microscopy

Use of a microscope, including dark field

Staining techniques

Use of a hemacytometer, size references and calculations

Part IV. Culturing/Enzymatic Techniques

Semi-selective solid media

Oxidase, urease, etc.

Biolog

Part V. Serological Techniques

Serology

ELISA

Immunostrips

Part VI. Molecular Techniques

Finding protocols, importance of positive and negative controls

Primer use, ordering, aliquoting, storage

Extraction of nucleic acids

PCR (including multiplex and nested)

rtPCR

qPCR

Multiplex and nested PCR

Sequencing/Sequence Analysis

Part VII. Practical Examination/Presentation of Unknown

Disclaimer: This syllabus represents my current plans and objectives; it is subject to change as the need arises. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.