

PLP 6291: THEORY AND APPLICATION OF DISEASE DIAGNOSIS

3 CREDITS (GRADED, LECTURE), SUMMER A, ONLINE (SEMI-SYNCHRONOUS)

"The diagnosing of ... diseases is a scientific art that is enhanced with experience and constant study."
Malcolm Shurtleff and Charles Averre. The Plant Disease Clinic and Field Diagnosis of Abiotic Diseases. 1997. Page 1. The American Phytopathological Society. St. Paul, MN.

INSTRUCTOR: Carrie Lapaire Harmon, PhD

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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 Teams or Zoom. Course-related communications will be addressed once per weekday, between 9 am and 4 pm eastern.

COURSE WEBSITE: <http://elearning.ufl.edu>

COURSE COMMUNICATIONS: Questions and discussion are encouraged; the majority of questions should be raised on the class discussion board to allow for group comment and learning. Private questions should be sent to the instructor using the messaging app within the course.

REQUIRED TEXT: There are no required texts. Assigned readings will be provided via the course website, within the appropriate module.

ADDITIONAL RESOURCES: Recommended texts will be available for reference in the Plant Diagnostic Center library during office hours: The Plant Disease Clinic and Field Diagnosis of Abiotic Diseases; Shurtleff and Averre, The American Phytopathological Society. St. Paul, MN; Essential Plant Pathology, Schumann and D'Arcy, 2nd Edition.

COURSE DESCRIPTION: The goal of disease diagnosis is to identify the causal agent of decline so as to prescribe management to reduce damage caused by diseases. This course summarizes the methods and strategies used to diagnose diseases. We will train the participant in critical thinking skills need to assess the problem, develop a working hypothesis, test hypotheses,

synthesize a diagnosis, and prescribe management/therapeutic actions. The lab portion of the course will provide hands-on training in application of the techniques, encouraging collaborative learning to foster independent diagnostic skills and method troubleshooting. Although this course is not intended as a primer in plant pathology, we will discuss specific organisms and diseases as they apply to specific cases. Over the course of the module, students will synthesize knowledge of organismal biology, epidemiology, chemistry, technology, and economics with methods and techniques to develop strategies for disease diagnosis.

PREREQUISITE KNOWLEDGE AND SKILLS: PLP 3002C or PLP 5005C or general plant pathology equivalent, and Fungal Plant Pathogens, PLP 6262C, are prerequisite for this course. Bacterial Plant Pathogens, PLP 6241C is highly recommended, and courses in microbiology and biochemistry are recommended, but not 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, play the lectures, link to online resources, participate in chat-type discussions, use and respond to email, and produce and upload written and video content to the course website.

PURPOSE OF COURSE: The purpose of this course is to advance students' knowledge of the process for diagnosing diseases, incorporating hypothesis development, diagnostic tests, and management prescriptions.

JUSTIFICATION: Training in critical thinking is necessary for the professional development of our practitioners, regardless of whether they work in zoonotic or botanical disease systems. I hope this course provides a venue for conversation and cross-fertilization between the disciplines, creating well-rounded practitioners who understand the science behind their profession.

COURSE GOALS AND OBJECTIVES: By the end of this course, students will/will be able to:

- ✓ define disease in general terms; label and define the importance of the four components of the disease pyramid
- ✓ define "normal" for a given host, and contrast with abnormal growth and disease symptoms
- ✓ define types of inoculum, examples of initial vs continuous (monocyclic vs polycyclic)
- ✓ contrast disease incidence and severity
- ✓ contrast bacterial disease symptoms and signs, name the diagnostic tests and expected results, discuss potential pathogen spread, discuss cultural/environmental factors conducive to bacterial disease development
- ✓ contrast viral disease symptoms and signs, name the diagnostic tests and expected results, vectors, identify vectors/means of spread, discuss cultural/environmental factors conducive to viral disease development

- ✓ contrast fungal disease symptoms and signs, name the diagnostic tests and expected results, discuss cultural/environmental factors conducive to fungal disease development, and define means of pathogen movement/spread
- ✓ recognize symptoms/signs of common abiotic and arthropod/other agent damage, identify the lab/agent who can identify each type of plant problem
- ✓ identify the information needed and samples required for submission to a lab, interpret lab results
- ✓ explain sanitation in a greenhouse, field, nursery setting; describe general and pathogen-specific cultural management tools
- ✓ identify diagnostic test component costs (labor, product, costs/benefits)
- ✓ calculate solution and solute amounts
- ✓ understand important points in instrument calibration
- ✓ describe ethical issues that must be considered in selecting tests and interpreting results
- ✓ use knowledge of diagnostic method theory to troubleshoot hands-on techniques

INSTRUCTIONAL METHODS: This course is comprised of six weeks of online lectures and activities. 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 and encourage development of a peer cohort for future, post-course support and collaboration.

COURSE POLICIES:

ATTENDANCE POLICY: Your registration in this course indicates your willingness to participate fully. As this is an online course, you may progress through the modules at your own pace, within the week-long time frame of the assigned modules. Participation is gauged during discussion boards (which count as part of the overall grade). 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, and the final timed, open-book exam. The final exam is cumulative and occurs the last week of the course. You may inquire about quiz and exam grades for 48 hours following the return of grades for that quiz or exam; feedback should be pertinent to the learning objectives at that time. I will regrade the entire exam/quiz/assignment, not just the question indicated.

MAKE-UP POLICY: Quizzes 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 within 24 hours of 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! Make-up for the final exam will be granted only under extreme situations and may require documentation such as a doctor's note. However, you may take the final exam early, with the instructor's permission. Consult the instructor at least one week prior to the scheduled exam to request this option. The live discussions require attendance and participation of the students and instructor. As such, makeup will not be possible for live discussions.

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 are listed on the website and times are firm; plan accordingly. Rare exceptions may be made in the event of an emergency, see the make-up policy above. Requirements for class attendance and make-up work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

COURSE TECHNOLOGY: This course is delivered through the online resource, Canvas. The course and support and resources are all available at <https://elearning.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.

GRADING POLICIES:

| Assignment | Percentage |
|--|------------|
| Quizzes | 45% |
| Activities/short assignments/discussions | 30% |
| Final exam | 25% |
| Total | 100% |
| | |

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

Assignments are weighted by the number of points assigned to them. Final grades are

| Letter grade | % | Points | calculated as total points earned out of total points possible for the course assignments. Total points for the course equal 213, and the number of points needed to reach a certain letter grade or percent grade are noted in the table to the left. I round one decimal point, so an 83.5 becomes an 84, as does an 84.4. |
|--------------|--------|--------|--|
| A | 94-100 | 200 | |
| A- | 90-93 | 191 | |
| B+ | 87-89 | 185 | |
| B | 84-86 | 178 | |
| B- | 80-83 | 170 | |
| C+ | 77-79 | 163 | |
| C | 74-76 | 157 | |
| C- | 70-73 | 149 | |
| D+ | 67-69 | 142 | |
| D | 64-66 | 136 | |
| D- | 60-63 | 127 | |
| E | <59.5 | <126.5 | |
| Total points | | 213 | |

LATE ASSIGNMENTS POLICY: Although you should make every effort to submit your assignments on time, late assignments will be given half credit (the assignment will be graded, then that grade will be divided by two for your final grade for the assignment) if turned in within two days of the due date. After that, the assignment grade will be a zero; each assignment is open for a specific time period, often one week.

EXTRA CREDIT: Development of a short video (45 seconds to 2 minutes) on a specific topic related to disease diagnosis will be considered for one extra credit project, with points equal to one quiz (5pts). The objective of the project will be to enrich the course material with an explanation of a specific concept (e.g., how a specific host-pathogen system is detected or diagnosed). The project must be outlined and proposed to the instructor and *approved* by the instructor at least two weeks prior to the last day of lectures, and the final product submitted by 5pm the day before the final exam. Projects will be worth up to five points, and the points awarded for the project will be added to the final points earned. There is no penalty for not submitting an extra-credit project.

Course Schedule:

This course will be taught as a series of modules. You will need to complete the assessment(s) within each module before you can open a new module. Modules will open each Friday at 5:01 pm Eastern time, with most assignments and quizzes due the following Friday by 5:00 pm. The final exam will be open for a 1.5-hour window of time on the exam day; you may start the exam at any point during the day between 9 am and 7 pm, 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 to ensure full time). These timelines will be detailed during the first lecture.

| Topic | Description | Assignment/ Assessment |
|---|--|---|
| Week 1: May 15-19 | | |
| Course Overview | Review of syllabus, grading policy, expectations, how to get help, review accommodations responsibilities; explanation of flow of concepts | Quiz and discussion thread |
| Defining Disease | What is a disease; disease pyramid | |
| Symptoms and Signs: Foliar | Symptoms and signs of foliar diseases | |
| Symptoms and Signs: Root rots, vascular issues | Symptoms and signs of canker, dieback, root rot, vascular diseases | Quiz |
| Epidemiology Basics | Disease progress curve; disease cycle; incidence and severity; spread | Quiz |
| Sample Triage | Steps to maximize your sample | Activity |
| Developing a Hypothesis | Symptoms, signs, objective observation, and the educated guess | Activity/Quiz |
| Week 2: May 22-26 | | |
| Insufficient samples | Making the determination; communicating with and educating the submitter | |
| Sample collection and submission | Appropriate samples, photography, educating your submitter, submission forms | Collection and submission activity, peer grading activity |
| Identification and management of viral diseases | Symptoms, signs, diagnostic tests, cultural/environmental factors, potential means of spread | Quiz |
| Identification and management of bacterial diseases | Symptoms, signs, diagnostic tests, cultural/environmental factors, potential means of spread | Quiz |
| Identification and management of fungal diseases | Symptoms, signs, diagnostic tests, cultural/environmental factors, potential means of spread | Quiz |
| Week 3: May 30-June 2 | | |

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| Confounding factors | Abiotic issues, nematodes, insects; vectors; asymptomatic hosts | Quiz |
| Testing a hypothesis | Questions to ask, organizing your work, what else do you need to know to proceed? | Assignment: questions for your client |
| Disease management | Reading a pesticide label, finding products, emergency exemptions, culturing patience | Quiz |
| Writing a prescription | Writing a management recommendation for the client | Activity: write a rec |
| Week 4: June 5-9 | | |
| Lab safety | Chemical hygiene plan, PPE, hazard assessment | Quiz |
| Protocols and controls | Where to find them, validation | |
| Instrumentation and equipment | Use, maintenance, and calibration | |
| Which tests to use? | Serving the client, from start to finish | |
| Microscopy | Anatomy, use, and care of dissecting and compound microscopes; photography | Activity |
| Culturing | Nonselective and semiselective media for fungi and bacteria, solutions, timing of additives, pouring, plating | Quiz |
| Baiting | Baiting soil and water for oomycetes | |
| Bacterial tests | Streaming, HR, enrichment, LOPAT | Quiz |
| Week 5: June 12-16 | | |
| Bacterial tests | Gram tests (staining and KOH) | |
| ELISA and Serology | DAS, TAS, and lateral flow serology | Quiz |
| Molecular Tools | PCR and other types of nucleic acid detection, sequencing, BLAST, interpretation for the lab and for the client | Quiz |
| Interpreting a diagnosis | What data to collect; diagnosis; interpreting results | Quiz |
| Curious Cases and Twenty Questions | Tips and tricks for basic categories and some special situations | Discussion thread |
| Desktop diagnostics | Teaching others to perform triage diagnostics in the field/office | Activity: Video explanation (<2min) of a field diagnostic technique of your choosing |

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| Putting it all together | Preparation for final exam | Assignment: Develop and submit 5 exam questions |
| Week 6: June 20-23 | | |
| Budgets | Tracking expenses, income, and developing a cost-recovery-based price list | Activity: cost analysis |
| Ethics and reporting | Finding balance in our responsibilities, legal obligations, what to do when it's something new | |
| The other HR | Hiring, mentoring, and professional development | Activity: Developing your hiring style |
| Final exam (90 minutes, open book) | | |

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

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.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: 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 honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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/honorcodes/honorcode.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: 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/>.

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.

Students experiencing crises or personal problems that interfere with their general well-being 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/cwc/
Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library
Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu/
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

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.