PLP 6942: PROFESSIONAL INTERNSHIP IN PLANT DISEASE DIAGNOSIS

3 CREDITS (S/U), LABORATORY ONLY, ALL SEMESTERS

"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) or by Zoom/Teams. Course-related communications will be addressed once per day, between 9 am and 4 pm eastern, M-F.

COURSE LABORATORY SITE: Building 1291, Room 112 for lectures/presentations, 2570 Hull Road (the UF-IFAS Plant Diagnostic Center). Online presence in Canvas if necessary.

COURSE COMMUNICATIONS: Questions and discussion are encouraged during in-lab time. Private questions should be sent to the instructor at clharmon@ufl.edu.

REQUIRED TEXT: There are no required texts, but assigned readings may be provided for enrichment; they will be provided by the instructor as needed.

REQUIRED PPE: The UF-IFAS Plant Diagnostic Center is first a clinical laboratory serving the public, and second a teaching laboratory supporting experiential learning for our students. As such, we acknowledge some risk of exposure to plant pathogenic organisms and laboratory hazards. To support a safe learning and working environment PPE is provided appropriate to the task and hazard and its use is required.

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. 1997. The American Phytopathological Society. St. Paul, MN; Essential Plant Pathology, Schumann and D'Arcy, 2nd Edition.

COURSE DESCRIPTION: This course summarizes the methods and strategies used to diagnose plant diseases. We provide hands-on training in the art and science of plant disease diagnosis, where students observe and then perform various laboratory techniques. Students are taught

critical thinking skills needed to: assess the problem, develop a working hypothesis, test hypotheses, synthesize a diagnosis, and prescribe management/therapeutic actions. Over the course of the internship, students will synthesize knowledge of organismal biology, epidemiology, and chemistry with methods and techniques to develop strategies for disease diagnosis.

PREREQUISITE KNOWLEDGE AND SKILLS: Plant Disease Diagnosis, PLP 6291, and Fungal Plant Pathogens, PLP 6262C, are required prior to taking this internship. Bacterial Plant Pathogens PLP 6241C is highly recommended, and courses in plant pathology, viral plant pathogens, microbiology, and biochemistry are recommended, but not required.

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. The need for hands-on training is evident in the dozens of requests I receive each year for internships, visits, and training from UF grad students and plant diagnosticians around the world. I hope this course provides an opportunity for students to build skill sets that include critical thinking, laboratory techniques, extension interactions, and sample management, 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:

- ✓ understand and apply performance attributes of basic laboratory techniques (e.g., pipetting, calculations for solutions and dilutions, light microscopy including dark field, use of hemacytometer, lab notebooks, lab safety)
- ✓ develop a plan to complete Koch's Postulates when appropriate
- ✓ make use of keys and references
- ✓ 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

- ✓ identify diagnostic test component costs (labor, product, costs/benefits)
- ✓ begin triage and characterization of unknown samples
- ✓ understand important points in instrument calibration/maintenance
- ✓ describe ethical issues that must be considered in selecting tests and interpreting results
- ✓ perform culturing/enzymatic techniques (e.g., semi-selective solid media; oxidase, Biolog, urease, etc.)
- ✓ understand and apply performance attributes of serological techniques (e.g., serology, ELISA, lateral flow devices)
- ✓ understand and apply performance attributes of molecular techniques (e.g., primer use, ordering, aliquoting, storage; PCR (including multiplex and nested); qPCR; qPCR; multiplex and nested PCR; sequencing/sequence analysis)
- ✓ **think critically to assess a sample, develop a working hypothesis, run diagnostic techniques to test the hypothesis, develop a diagnosis, recommend management actions**

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. I have found that the best way to learn something is to teach it to others, so I encourage peer-to-peer learning and evaluation opportunities. I strive to provide prompt evaluation and return grades quickly so students can incorporate the feedback.

INSTRUCTIONAL METHODS: Each student must spend 8 hours in the laboratory each week, to be split into two four-hour blocks, with no more than two student interns in the lab at any one time. Additional time outside of this schedule may be required to complete assignments and the diagnostic unknown project.

As this is a professional internship, students will be starting hands-on duties the first week of class. Students will work alongside diagnosticians, first observing techniques, then performing them later in the semester, as the need arises for that skill during the diagnosis of real plant disease samples. Each technique is listed in a sheet to be completed by the end of the semester. The final exam is hands-on diagnosis of an unknown sample (provided by the

instructor). An oral presentation to the class and laboratory staff, detailing the process of diagnosis of the unknown, is required in the last two weeks of the semester.

COURSE POLICIES:

ATTENDANCE POLICY: This course is evaluated in large part on completion of hands-on laboratory work. Thus, late arrival to and absence from class is strongly discouraged. Absences may be excused by the instructor on a case-by-case basis if a personal emergency requires the student to miss class. Make-up laboratory assignments may be allowed if previously planned and scheduled with the instructor. At the discretion of the instructor, written assignments may replace the required laboratory if the absence is excused. Failure to attend two or more laboratory sessions, even with approval from the instructor, may result in an "Incomplete" grade for the course. Withdrawal from this course must be during the normal add/drop window designated by UF.

EXAM POLICY: The final exam, a diagnosis of an unknown sample, will be completed independently with minimal input from lab staff. The project will require application of all knowledge gained throughout the course and may necessitate additional laboratory time to complete. Do not wait until the last minute to complete this project. Remember that the project utilizes live plant material and cultures and is thus time-sensitive. Rare exceptions may be made in the event of an emergency. 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: Some materials for this course may 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.

GRADING POLICIES:

Requirements for passing grade	
Laboratory attendance	no more than 4 unexcused laboratory hours
Maintenance of laboratory notebook	Document techniques learned, sample observations
Final laboratory practical and presentation	correct diagnosis of unknown sample, detailed process lab report (oral)

GRADING SCALE: This course is taught Pass/Fail (reported as S/U).

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. Please plan accordingly.

Course Schedule:

FINAL PROJECT PRESENTATIONS: Last 2 weeks of semester, to be scheduled

This course may include supplemental material online in Canvas. This is a hands-on course working on submitted samples and specimens. As such, the order of topics will depend largely on the samples we receive. The table below is simply examples of topics to be covered over the course of the semester.

Topic	Description
Week 1:	
Course overview	Review of syllabus, grading policy, expectations, how to get help, review accommodations responsibilities; explanation of flow of concepts, laboratory notebook and lab training system
Laboratory Safety	UF Chemical Hygiene Plan, complete any required EH&S LATCH online trainings
Weeks 2-6:	
Identification and management of bacterial diseases	Symptoms, signs, diagnostic tests, cultural/environmental factors, potential means of spread
Identification and management of viral diseases	Symptoms, signs, diagnostic tests, cultural/environmental factors, potential means of spread
Identification and management of fungal diseases	Symptoms, signs, diagnostic tests, cultural/environmental factors, potential means of spread
Developing a hypothesis	Questions to ask, logic
Confounding factors	Abiotic issues, nematodes, insects; vectors; asymptomatic hosts

Interpreting a diagnosis	What data to collect; sample collection; diagnosis; interpreting results
Which tests to use?	Serving the client, from start to finish
Diagnostic techniques	Sample triage, light microscopy, culturing/enzymatic techniques, serological techniques, molecular techniques
Weeks 13-14:	
Final laboratory practical examination	Diagnosis of an unknown sample. Hands-on laboratory work and final presentation of techniques and results

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.

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. To respect privacy, screen capture of discussions, lecture recordings, and any other recording is allowed only for personal use in study during the semester and is strictly prohibited to be shared outside the class. Violation of these rules will result in consequences such as discussion with UF administrators, removal of course privileges, and possible impact on grades.
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.

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.