

Syllabus for PLP 4290C - Principles of Plant Disease Diagnosis (2 credits)
PLP 6291C - Plant Disease Diagnosis (3 credits)
Fall, 2007

Instructor: Dr. Carol Stiles

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Office hours: Please call or send an e-mail to set up a time to visit. You are encouraged to visit with me to clarify concepts, assignments, etc. If the question is fairly simple I may be able to address it by e-mail. [Office hours Thursday 1:00 – 1:55 PM, prior to ALS 5934]

Class Format and Meeting Times: The lecture is scheduled for period 3 (9:35 a.m.) followed by a laboratory (periods 4 and 5, 10:40 – 12:35) on Mondays and Wednesdays, in Rm. 2306. Lecture and lab may be combined. Although there will be time for students to work on independent collections and laboratory assignments during the laboratories, additional time outside normal lab hours may be required. One or two field trips may be scheduled that might take more than the three-hour class period.

Teaching assistant: Jodi White, e-mail: jodiwhit@ufl.edu

Objectives: This course focuses on the diagnosis of plant diseases caused by fungi, bacteria, viruses, and other organisms, and disorders associated with abiotic or environmental conditions. Students will learn various techniques to detect pathogens and associate particular pathogens and abiotic factors with particular symptoms of disease in plants. *Each student will begin to develop a diagnostic approach and philosophy of his or her own – the “art” of diagnosis.* Students will also learn how to find information on management recommendations for diagnosed diseases and to prepare diagnostic responses.

Prerequisite: Students must have completed a General Plant Pathology course (e.g., PLP 3002/5005) and Fungal Plant Pathogens (PLP 4260/6262).

Textbook/References: Readings will be placed on reserve in the PLP Teaching Support Lab and the DPM room, or will be available electronically from the library or internet. Some required readings will be taken from review and journal articles; a partial list of these is in this syllabus. Handouts and references may also be provided by the instructor and guest lecturers.

Grading: The course grade will be based on three exams (100 points each), diagnosis of disease samples, and a project/report. Exam format may include short answer, problem-solving, scenario, essay questions, and take home assignments. Exams will build upon material covered earlier in the semester and will also cover guest lectures, student presentations, demos, field trips, exercises, etc., from both lecture and lab. The approximate point distribution will be as follows:

Exams (3)	300 points
Diagnosis of disease samples	200 points
Projects/report	50 points
Lab notebook/activities/quizzes	50 points
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Total	600 points

Based upon this point total, 540 points (90%) or above = A, 480–539 = B (80%), 420–479 = C (70%), 360–419 = D (60%) and < 360 (<60%) = E.

Student activities and projects

A) **Diagnosis of diseased samples:** Each student will diagnose diseased plant samples and turn in a one-to two-page summary form *documenting* each diagnosis, the steps taken to make and confirm the diagnosis, a diagnostic response, and management recommendations. These samples may be collected by the student or obtained from other sources, however the specific source and county location must be given on the diagnostic sheet. Some samples will be provided in class and some will be “assigned” to students; assigned samples must be returned with a diagnosis to get full credit on the collection. Students taking the graduate course (PLP 6291C) will need to turn in 20 diagnoses, while students enrolled in the undergraduate course (PLP 4290C) will turn in 10 diagnoses. You should give each of your samples a number in the format: **your initials – number**, (e.g., cms-1, cms-2, etc.) and, if it is a sample from the Plant Disease Clinic or other “assigned” sample, also give the designated sample number. Each plant sample counts as *one sample*, even if multiple diseases are diagnosed. Each graduate student should turn in at least one disease caused by each of the following: bacteria, virus, chromistan, abiotic or environmental factor, a soilborne pathogen, a turfgrass sample, and three fungal diseases which should include one mitosporic, one ascomycete, and one basidiomycete fungus. Undergrads should strive for at least one bacterial, one viral, and one fungal disease. The remaining samples can be any combination of the above, however, *no more than two* abiotic or post-harvest diseases may be included in the collection. Samples with insect damage only will not be accepted. Collected nematode samples must have “disease-like” symptoms; please show the sample to the instructor with collection information prior to submitting it. Each student will maintain and submit an Excel file that summarizes his/her collection. Some samples (e.g., viral, bacterial, turfgrass samples) will be provided for you and will be part of your collection; however, some diseases that are used as examples – such as *Entomosporium* on Indian hawthorne and rust on St. Augustinegrass – cannot be turned in as part of the collection. **The goal in this class is to learn the “art and science” of diagnosis, rather than finding diseases you already know!** Thus, when each student’s collection is evaluated, one criterion that will be considered is “degree of difficulty.”

B) Diagnostic response and disease management recommendation: Each student will prepare diagnostic responses for three different diseases with diagnostic and disease management information (cited) in a two-page format (provided by instructor as an electronic file). The three diseases should include at least two different major groups of pathogens (e.g., fungal and viral or bacterial). At least one should be from a sample diagnosed for this course, another one will be from the instructor’s list of diseases, and the third is of the student’s choice (a sign-up list will be provided to avoid duplication). Each will include a complete list of references used. These cards will be submitted as electronic files (Word or .rtf), with the first one due **31 October** and all final versions due on **26 November**. Each student will choose one to present (**19 Nov**) to the class, serving as “clientele” – student will give brief (5-8 minute presentation) and answer questions.

C) Each student will maintain a *bound or spiral (not 3-ring)*, **laboratory notebook** (*unlined paper*) with his or her *detailed* observations of diagnoses, demonstration material, field trips, and so on; this notebook also will document the participation of the student in the laboratory, and will be a reflection of the student’s development as a professional. Notebooks will be graded on neatness, completeness, organization, accuracy, and so on. The lab notebook should not be typed – it should however be neat and organized! The lab notebook should be an *ongoing* daily record of what you do during the lab – thus you should record your notes each time you work on lab activities; do not try to put together or re-write the notebook in the last week of class. Notebooks will be due **the last day of class, 6 December**.

Please start each lab period on a new page, and remember to date it. Each drawing should be labeled with the view or section, the name of the host plant, the suspected or identified pathogen, and the total magnification (for microscopic illustrations). Each step taken, each piece of information obtained, should

be recorded to document and justify your diagnosis. You may have two sections in the notebook: one for sample documentation, and one for other activities and observations.

Attendance / Participation: Students are expected to attend all lectures and laboratory periods, since being present for lectures and participating in laboratory is necessary for learning the material. Please note that since we are working with fresh plant material, fungal cultures, etc., and since different students work at different paces, it may be necessary to complete lab work outside of the lab period. Also, because we are working with fresh material, it may not always be possible to schedule a make-up lab at a later time. Should you miss a class, you are still responsible for the material covered during that class. If an absence from a laboratory period is unexcused, you may not receive credit for that laboratory exercise. Makeup exams and assignments will be given only in the case of excused absences; it is the student's responsibility to make arrangements for makeup work, within 2 days of the missed absence. Please notify me of the absence before or as soon as possible. **Late work or assignments may have points deducted, up to an amount equal to one letter grade for each day late.**

A note about sample collection for this class: we will be working with individuals at the Plant Disease Clinic, the Division of Plant Industry, and with other faculty in the Plant Pathology department, to provide demonstration and sample material for this class. The instructor and teaching assistant will be the liaisons with these individuals to obtain samples for the course – as a professional courtesy, please do not approach them at other times for individual samples. On the other hand, if a time is set up for you to work on a particular diagnostic technique in another lab or setting (e.g., the clinic), please make every effort to be on time, be prepared, and work efficiently while there.

Additional information - formats for citations and reference lists:

In text and on photos: (author, yr)

In citation list, use the following formats:

Book: Author(s). Year. Title. City: Publisher.

Book chapter: Author(s) of chapter. Year. Title of ch. *in* Title of book. Editors. City: Publisher.

Journal article: Author(s). Year. Full title of article. Title of journal. Volume: Page numbers.

(or date and page numbers, for magazine / trade journals)

Internet Site: Author(s), if known. Title. Source (database, journal, newsletter, conference, etc.). Any identifying number (e.g., DOI number, Ext. publ. No.). Date of publication. Publisher. Date of access.

Online at: internet site address [use copy&paste].

Note: for internet sites, please make every effort to identify both the author(s) and publisher. Only with this information can one make an informed decision about the validity of the information. If you cannot find the author(s), you may want to be very cautious about using the information, although if you decide to use it, cite the author as "Anonymous" but be sure to give the publisher (university, company, agency, etc.). Also, it is difficult to "give credit where credit is due" if the author is not easily discerned, but that does not mean that it's not necessary to provide appropriate citation – an internet address is *not* adequate citation!

PLP 4290/6291 Plant Disease Diagnosis
Tentative Schedule of Topics*

	Lecture topics	Lab topics/activities/readings*
27 Aug	Learning objectives The “art and science” of diagnosis Philosophy and approach Intro to diagnostic settings [Ausher et al., 1996; Grogan, 1981]	Lab safety / microscopy Recognizing the healthy plant
29 Aug	The diagnostic process Field signatures Abiotic vs. biotic Fungal vs. bacterial vs. viral	Visualizing pathogens - microscopy Symptoms vs. signs [Schubert et al, 1999; Walker et al., 1997; Stiles et al., 2002]
3 Sep	<i>Labor Day – Holiday!</i>	
5 Sep	NPDN First Detector Educator training - C. Harmon [Riley et al., 2002; Pernezny et al. 2000, Hudelson]	NPDN Mission Monitoring for High Risk Pests Sample Collection / Submission Art and Science of Diagnosis Digital Photography Digital diagnosis – DDIS
10 Sep	Field trip	Leave promptly at 9:35 a.m.
12 Sep	Abiotic diseases – R.J. McGovern	Look at field samples in lab
17 Sep	Greenhouse scenarios – R. Cating	Fungal Diseases – C. Stiles Fungal identification
19 Sep	Fungal diseases, cont.	Saprotrophs vs. pathogens Primary vs. secondary pathogens
24 Sep	Diagnostic response / Management recommendations – C. Stiles	Fungal diseases, cont.
26 Sep	Bacterial Diseases – J. Jones	
1 Oct	Soilborne pathogens – C. Stiles	Turf sample / soilborne pathogens lab
3 Oct	Turf Disease Diagnosis – P. Harmon <i>Stowell and Gerlenter, 2001</i>	
8 Oct	Exam I	
10 Oct	Immunological and DNA-based (PCR) detection tools – C. Stiles	<i>Plyler et al, 1999; Schaad et al., 2003;</i>
15 Oct	Viral Diseases – C.A. Baker	Viral inclusions – Richard Cullen (in clinic)
17 Oct	*	

22 Oct	HR tests / physiological tests – R. Cullen	First set diagnoses due – 22 Oct
24 Oct	PCR detection - A. Vitorelli	<i>Sholberg et al., 2005; Kox et al., 2007</i>
29 Oct	Q&A landscape scenarios - C. Stiles	Lettuce samples – Isolation
31 Oct	First diagnostic response due electronically *	Pure culture - bacterial isolate Friday – start fresh bacterial cultures for HR
5 Nov	Exam II	Start HR test - clinic
7 Nov	Gary Brinen, Extension Faculty	Read HR test; Real-time PCR Plant Disease Clinic – tour
12 Nov	<i>Veterans Day - holiday</i>	
14 Nov	* <i>Wallace, 1978</i>	Second set diagnoses due - 14 Nov
19 Nov	Presentations – diagnostic response;	
21 Nov	Presentations, cont. if needed.	<i>Lab open to work, if needed</i>
22-23 Nov	Thanksgiving Holiday!	
26 Nov	Diagnosis in disease forecasting – C. Stiles	All diagnostic responses due electronically (26 Nov)
28 Nov	Q&A	
3 Dec	Q&A	All diagnoses due – 3 Dec Excel file with collection info also due
5 Dec	Exam III Last day of class – 5 Dec	Lab notebooks due –5 Dec
Finals week		

All deadlines by end of lab; please send electronic submissions prior to the class.

***Other speakers and demonstrations may be arranged as schedules or opportunity permit. Work on diagnosing unknown samples will continue throughout the lab exercises, even during portions of labs with other demonstrations scheduled. See list of reading references at end of syllabus. Speakers may provide additional hand-outs, reading, etc.**

Information for Students for Syllabi / Course Policy

UF COUNSELING SERVICES: Resources are available on campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include: 1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling; 2. Student Mental Health, Student Health Center, 392-1171, personal counseling; 3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual assault counseling; and 4) Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling. Help is available 24/7 from Alachua County Crisis Center, 352-264-6789.

ACCOMMODATION: *Students With Disabilities Act*

The Dean of Students Office, Disability Resource Center, coordinates the needed accommodations of students with disabilities. This includes the registration of disabilities, academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faculty-student disability related issues. Disability Resource Center, 0020 Reid Hall, Phone: (352) 392-8565, <http://www.dso.ufl.edu/drc/>

SOFTWARE USE / COPYRIGHT: 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.

ACADEMIC HONESTY: Please read through the following websites. *If you are not sure what constitutes plagiarism, please contact the instructor before starting your project.* Please note that quoting or paraphrasing extensively (e.g., copying and pasting extensive information from internet sources, even with citation) are considered types of plagiarism. More importantly, **this practice is unprofessional** and does not demonstrate that the student has “synthesized” the material. In the case of disease management recommendations, **it is your professional responsibility to “vet” the information, e.g., to ensure that it is current and efficacious.** If you are not sure how to extract information from scientific sources, interpret and summarize this information, and write professional scientific papers, etc., then please consult your instructor and/or professor(s) before beginning your work!

University policy regarding “Standard of Ethical Conduct” is available from the UF Student Guide at: <http://www.dso.ufl.edu/judicial/academic.php>

Further information on academic honesty and integrity is available from the Graduate Student Handbook, p. 48, available from a link online at: <http://gradschool.rgp.ufl.edu/students/introduction.html>

The minimum consequence for cheating and/or plagiarism is getting a zero on the assignment and possibly failing this course. Exams and assignments should represent your own work.

Academic Honesty/ Honor Code:

The University requires all members of its community to be honest in all endeavors. Cheating, plagiarism, and other acts diminish the process of learning. When students enroll at UF they commit themselves to honesty and integrity. Your instructor fully expects you to adhere to the academic honesty guidelines you signed when you were admitted to UF. As a result of completing the registration form at the University of Florida, every student has signed the following statement:

“I understand the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

Furthermore, on work submitted for credit by UF students, 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 to be assumed that all work will be completed independently unless the assignment is defined as a group project, in writing by the professor. This policy will be vigorously upheld at all times in this course.

Readings for Plant Disease Diagnosis: These are in approximate order for the semester - further comments will be given in class. There may be additions as new articles are found.

General websites – read and review:

Riley, M.B., M.R. Williamson, and O. Maloy. 2002. Plant disease diagnosis. The Plant Health Instructor. DOI: 10.1094/PHI-I-2002-1021-01. *Online at:* <http://www.apsnet.org/education/IntroPlantPath/Topics/plantdisease/>

Pernezny, K., G. Simone, J. Collins, R. Lentini. 2000. Plant Pathology Guidelines for Master Gardeners. Everglades Res. and Ed. Ctr., Univ. of Florida IFAS. <http://erec.ifas.ufl.edu/MG/index.htm> (Modules 1 – 6, and “Oh no! -- A quiz” in Module 9).

Hudelson, B.D. Plant Diseases, General Master Gardner Training. Dept. of Plant Pathology, Univ. of Wisconsin. *Online at:* <http://www.plantpath.wisc.edu/PDDCEducation/MasterGardener/General/TofC.htm> (Many photos of symptom types, characteristics of pathogens, etc.).

Reading:

Grogan, R.G. 1981. The science and art of plant disease diagnosis. *Ann. Rev. Phytopathol.* 19:333-51.

¹Ausher, R., I.S. Ben-Ze'ev, R. Black. 1996. The role of plant clinics in plant disease diagnosis and education in developing countries. *Annu. Rev. Phytopathol.* 34:51-66.

Schubert, T.S., L.L. Breman and S.E. Walker. 1999. Basic concepts of plant disease and how to collect a sample for disease diagnosis. Plant Pathology Circular No. 307. Fla. Dept. Agric. & Consumer Services, Division of Plant Industry, Gainesville, FL.

Walker, S.E. and T.S. Schubert. 1997. Assessing plant problems in cropping systems: a systematic approach. Fla. Dept. Agric. & Consumer Services, Division of Plant Industry. Gainesville, FL.

Stiles, C.M., M.T. Momol, P.D. Roberts, R. McMillan, R.E. Cullen, and G.W. Simone. 2002. Florida Extension Plant Disease Clinic Network. Publ. No. RF-SR-007, Florida Cooperative Extension Service, IFAS, Gainesville, FL. *Online at* <http://edis.ifas.ufl.edu/SR007> (Guidelines for samples and interpretation of results)

¹Stowell, L.J. and W. D. Gelernter. 2001. Diagnosis of turfgrass diseases. *Annu. Rev. Phytopathol.* 39: 135-155

Plyler, T.R., G.W. Simone, D. Fernandez, and H.C. Kistler. 1999. Rapid detection of the *Fusarium oxysporum* lineage containing the Canary Island date palm wilt pathogen. *Phytopathology* 89:407-413. Now available online at: <http://apsjournals.apsnet.org/loi/phyto>

¹Schaad, N.W., R.D. Frederick, J. Shaw, W.L. Schneider, R. Hickson, M.D. Petrillo, and D.G. Luster. 2003. Advances in molecular-based diagnostics in meeting crop biosecurity and phytosanitary issues. *Annu. Rev. Phytopathology* 41:305-24.

Sholberg, P. D. O'Gorman, K. Bedford, C. André Lévesque. 2005. Development of a DNA Macroarray for Detection and Monitoring of Economically Important Apple Diseases. *Plant Dis.* 89:1143-1150.

Kox, L. F. F., van Brouwershaven, I. R., van de Vossenbergh, B. T. L. H., van den Beld, H. E., Bonants, P. J. M., and de Gruyter, J. 2007. Diagnostic values and utility of immunological, morphological, and molecular methods for in planta detection of *Phytophthora ramorum*. *Phytopathology* 97:1119-1129.

Wallace, H.R. 1978. The diagnosis of plant diseases of complex etiology. *Annu. Rev. Phytopathol.* 16:379-402.

¹Annu. Rev. Phytopath. – available online from UF Library, full-text since 1996.