

## PLHL 4000 – General Plant Pathology Syllabus

**4000 General Plant Pathology (4) F** *Prereq.: BIOL 1201 and 1208 or equivalent. 3 hrs. lecture; 3 hrs. lab.* Nature and cause of disease in plants; relation of environment and host-parasite interactions to development of disease symptoms caused by plant pathogenic fungi, bacteria, viruses, mycoplasmas, and nematodes; abiotic causes of disease; methods of disease control; diseases affecting Louisiana crops and ornamentals.

### **Schedule:**

Lectures	Tuesdays and Thursdays, 10:30 AM – 11:50 AM A465 Life Sciences Annex
Lab	Thursday 1:30-4:30 PM 308 Life Sciences Building

### **Instructor:**

Christopher A. Clark, Professor  
Department of Plant Pathology & Crop Physiology  
A443 Life Sciences Annex  
Phone: 578-1381  
Hours – by appointment. I will often be in the field on Mon., Weds., and Fri., and will try to be available as much as possible on Tues., and Thurs. I will check e-mail daily and it is best to first contact me by e-mail at:  
[cclark@agctr.lsu.edu](mailto:cclark@agctr.lsu.edu)

### **Course objectives and expectations:**

The objectives of the course include developing an understanding of principles and concepts in plant pathology so that students become familiar with what organisms cause disease in plants, how they cause disease, how disease cycles are used to understand the relationships between pathogens and plants and to guide management of diseases. Students will observe a broad range of plant diseases and will have hands-on experience in working with diseases and pathogens. Students will be introduced to different subdisciplines in plant pathology such as epidemiology and genetics and physiology of plant-pathogen interactions.

Material in the required readings may be included in exams whether or not it was discussed in class. Therefore, if there is material which is not clear in the reading and it is not clarified by the lectures on that subject, ask about it at the end of the appropriate lecture! Lecture notes will **not** be provided. However, outlines of lectures in PowerPoint will be provided on Moodle.

*"...merely being exposed to content is not sufficient for learning. It is not the lecture which produces learning; it is the studying, summarizing and organizing of lecture notes on which learning depends...In reality, a great deal of learning occurs outside the classroom when students are grappling with the content by themselves." - Marilla D. Svinicki, University of Texas, in: For Faculty 4(2):1-3.*

Some states specifically require two hours of significant student study outside the class for each one hour in class.

**Required text:**

Agrios, George N. 2004. Plant Pathology, Fifth Edition. Academic Press. 952 pages. (ISBN 10 = 0120445654; ISBN-13 = 978-0120445653)

This text is a very useful reference for anyone working with plants. Sections from it will be assigned for most lecture topics.

**Other Materials:**

Helpful weblinks will be posted on Moodle.

**Grading:**

Two semester exams – 20% each	40
Six lab quizzes	10
Ten lab assignments	10
Disease collection/Student presentation	15
Comprehensive final exam	25

**Schedule - Plant Health 4000 – General Plant Pathology  
Fall, 2013**

<b>Date</b>	<b>Lecture</b>	<b>Laboratory</b>
August 27	<b>What are plant pathology, disease, symptoms? Diseases in history</b>	
August 29	<b>The Disease triangle and disease cycles. How do diseases affect plants?</b>	<b>1 – Orientation, symptoms &amp; signs, types of disease, use of microscope</b>
September 3	<b>Diseases caused by fungi &amp; fungal-like organisms. Diseases caused by Myxomycetes,</b>	
September 5	<b>Diseases caused by fungi &amp; fungal-like organisms. Diseases caused by Plasmodiophoromycetes, Oomycetes, Zygomycetes</b>	<b>2 – Koch's Postulates, Diseases caused by Zygomycetes</b>
September 10	<b>Diseases caused by fungi. Diseases caused by Ascomycetes</b>	
September 12	<b>Diseases caused by fungi. Diseases caused by Deuteromycetes</b>	<b>3 – Diseases caused by Oomycetes</b>
September 17	<b>Diseases caused by fungi. Diseases caused by Ascomycetes and Deuteromycetes. Diseases caused by Basidiomycetes: Rusts</b>	
September 19	<b>Diseases caused by fungi. Diseases caused by Basidiomycetes: Smuts</b>	<b>4 - Diseases caused by Ascomycetes</b>
September 24	<b>Diseases caused by fungi. Diseases caused by Basidiomycetes: Rhizoctonia, Sclerotium et al</b>	
September 26	<b>Diseases caused by bacteria</b>	<b>5 – Diseases caused by Basidiomycetes: Smuts and Rusts</b>
October 1	<b><u>EXAM - I</u> (8/27-9/26 lecs, labs)</b>	
October 3	<b>Diseases caused by bacteria</b>	<b>6 – Diseases caused by Basidiomycetes: Rhizoctonia and Sclerotium</b>

October 8	<b>Diseases caused by viruses</b>	
October 10	<b>Diseases caused by viruses</b>	<b>7 – Diseases caused by bacteria</b>
October 15	<b>Diseases caused by viruses</b>	
October 17	<b>Diseases caused by viruses</b>	<b>8 – Diseases caused by viruses</b>
October 22	<b>Diseases caused by nematodes</b>	
October 24	<b>Diseases caused by nematodes Parasitic plants</b>	<b>9 – Nematodes</b>
October 29	<b>Mechanisms of pathogenicity Defense mechanisms of plants</b>	
October 31	<b>Defense mechanisms of plants</b>	<b>10 – Diseases caused by Deuteromycetes, Fusarium wilts</b>
November 5	<b><u>EXAM II</u> (9/26-10/29 lecs, labs)</b>	
November 7	<b><u>FALL BREAK</u></b>	<b><u>FALL BREAK</u></b>
November 12	<b>Defense mechanisms of plants Genetics of pathogen-plant interactions</b>	
November 14	<b>Genetics of pathogen-plant interactions Epidemiology</b>	<b>11 – Disease collections</b>
November 19	<b>Epidemiology Principles of plant disease management &amp; control</b>	
November 21	<b>Principles of plant disease management &amp; control</b>	<b>12 – Disease diagnosis and clinic visit?</b>
November 26	<b>Principles of plant disease management &amp; control</b>	
November 28	<b><u>THANKSGIVING</u></b>	
December 3	<b>Principles of plant disease management &amp; control</b>	
December 5	<b>Review Session</b>	<b>13 – Student presentations</b>

**PLHL 4000 – General Plant Pathology  
Readings**

Lecture Subject	Agrios 5 <sup>th</sup> Ed. pages*
What are plant pathology, disease, symptoms? .....	4-8
Prominent plant diseases in history	
Late blight of potato.....	19-21
Dutch elm disease, chestnut blight.....	32-36
Southern corn leaf blight	
The Disease triangle and disease cycles.....	77-103
How do diseases affect plants? .....	105-123
Diseases caused by fungi and fungal-like organisms .....	385-397
Myxomycetes (slime molds) .....	404-405
Plasmodiophoromycetes .....	405-407
Club root of crucifers .....	407-409
Oomycetes (water molds)	
Pythium damping off.....	410-414
Late blight of potatoes .....	421-426
Downy mildew of grapes .....	428-433
Chytridiomycetes.....	433-434
Zygomycetes	
Rhizopus soft rot of sweetpotato .....	434-438
Ascomycetes & Deuteromycetes .....	439-440
Peach leaf curl.....	445-447
Powdery mildew .....	448-452
Ergot .....	501-504
Apple scab.....	504-507
Brown rot of stone fruits.....	507-510
Sigatoka disease of banana .....	459-460
Leaf blights of cereals and grasses .....	463-472
Anthracnose .....	487-498
Fusarium wilts .....	522-526
Basidiomycetes .....	562-565
Stem rust of wheat.....	565-571
Fusiform rust of pines .....	580-582
Corn smut.....	583-586
Rhizoctonia and Sclerotium root and stem rots .....	593-600
Diseases caused by prokaryotes .....	616-626
Bacteria	
Bacterial blights of beans .....	629-630
Fire blight.....	641-647
Black rot of cabbage.....	653-654
Bacterial soft rot .....	656-662

Crown gall .....	662-666
Citrus canker .....	671-674
Common scab .....	674-675
Fastidious vascular bacteria .....	678-687
Mollicutes	
Phytoplasmas and Spiroplasmas .....	687-691
Diseases caused by viruses and viroids .....	724-752
Tobamoviruses – <i>Tobacco mosaic virus</i> .....	757-758
Potyviruses .....	764-767
Closteroviruses – <i>Citrus tristeza virus</i> .....	774-777
Luteoviruses – <i>Barley yellow dwarf virus</i> .....	781-782
Cucumoviruses – <i>Cucumber mosaic virus</i> .....	787-790
Tospoviruses – <i>Tomato spotted wilt virus</i> .....	795-799
Geminiviruses .....	805-809
Viroids .....	816-820
Diseases caused by nematodes .....	826-835
<i>Meloidogyne</i> spp. (root-knot nematodes) .....	838-842
<i>Heterodera</i> spp. (cyst nematodes) .....	842-849
<i>Pratylenchus</i> spp. (lesion nematodes) .....	849-853
<i>Ditylenchus</i> spp. (stem and bulb nematode) .....	858-860
<i>Belonolaimus</i> spp. (sting nematode) .....	860-863
<i>Aphelenchoides</i> (foliar nematode) .....	867-869
Parasitic plants .....	705-706
Dodder .....	706-708
Mistletoes .....	712-715
Algae ( <i>Cephaleuros</i> ) .....	719-722
Some mechanisms of pathogenicity .....	176-203
Some plant defense mechanisms .....	208-223, 229-242
Genetics of pathogens and their interactions with plants .....	125-142, 165-172
Plant disease epidemiology .....	266-289
Principles of plant disease management & control	
Exclusion .....	295-298
Eradication .....	298-314
Resistance .....	314-322
Protection .....	322-338, 345-348
Integrated management programs .....	348-351

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\* Agrios, G. N. 2004. Plant Pathology – 5<sup>th</sup> Edition. Elsevier Academic Press. 922 pp. (ISBN 10 = 0120445654; ISBN-13 = 978-0120445653)

## **PLHL 4000 Term Project - 2013**

### **Plant Disease Collection**

Each student will be expected to collect **five** diseases on or before **November 14**. You may also bring diseases to the lab for the appropriate pathogen group. For example, you may bring a rust or smut disease to the lab on Sept. 26 or a bacterial disease to the lab on Oct. 10 (be sure to turn in the list with items 1-4 below at that lab). For the purposes of this collection, bring only disease samples you believe are caused by microbial pathogens (i.e. not air pollution, chemical or environmental injury). Each student will be expected to bring samples in sufficient quantity suitable for isolations and moist chamber incubation (i.e. fresh tissue that has not been allowed to dry out or exposed to environmental extremes) of diseases including one from each of the categories below:

1. a leaf disease
2. a root disease
3. a postharvest disease

At the end of the laboratory on **November 21**, each student will be expected to turn in a report on the five diseases they collected during the semester. The labs on November 14 and 21 will be devoted to trying to further identify the diseases in the collections. For each disease, the report should include:

1. the name of the host plant
2. the location the sample was collected, including city, parish and the setting, such as garden, farm field, etc.
3. the symptoms observed when the sample was collected, including patterns of where symptoms occurred on individual plants and different areas in the field.
4. any disease triangle considerations, such as was there something in the environment that might have contributed to the disease or a particular variety of the host plant that had more disease than others?
5. a description of signs observed for each disease
6. the results of isolations and/or any other tests done to confirm the cause of the disease
7. a diagnosis of the cause or possible cause of the diseases with an explanation of the basis for the diagnosis.

At the lab on December 5, each student will also be expected to make a 10-min Power Point presentation on one of the diseases in their collection and submit the Power Point. The presentation will be limited to no more than two slides for each of the following 4 points (i.e. maximum number of slides = 8):

1. How did you diagnose the disease? What are the symptoms and signs of the disease? Are other procedures required for diagnosis?
2. Where has the disease been known to occur and what effect has it had historically?
3. Describe the disease cycles. Use the disease cycle to describe how the disease is managed or controlled?

4. Why do you think this disease is interesting (i.e., it is emerging as a bigger problem lately, or it is one for which there is not an adequate control program, or you are fascinated by the way the pathogen induces the disease, or you think it represents a novel way of controlling a disease, etc.)