

PLP4260 Introduction to Plant Pathogenic Fungi

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Class Location: 2306 Fifield Hall
Class Times: 8 week module : March 10 to April 23, 2014 (Final Exam: May 1)
Lectures: MWF period 7 (1:55-2:45 pm); R period 6 (12:50- 1:40 pm)
Labs: TR period 7-8 (1:55-3:50 pm)

Class Website: <https://lss.at.ufl.edu> (e-Learning in Sakai)
Office Hours: W & F 3:00-4:00 PM or by appointment, 1419 Fifield Hall

Course Description: This course is an introduction to the biology and diversity of fungal plant pathogens. Fungi and their allies are a diverse group of organisms that comprise the majority of plant pathogens. Their members are found in every fungal taxonomic order, as well as among numerous orders outside the Kingdom Fungi but traditionally studied as fungi, e.g., the Stramenopiles. This course will include a survey of taxonomic groups of fungal and fungal-like plant pathogens, an overview of common fungal pathogens in various types of plant culture systems, and discussion of general plant pathology principles as they relate to fungal pathogens. Lectures and labs are co-taught with the graduate course PLP6262C: Fungal Plant Pathogens. Students enrolled in the graduate course will have extra readings, a course project and more rigorous Exams and Quizzes relative to their undergraduate classmates.

Course Objectives: Students will learn to

- distinguish among taxonomic orders that contain fungal pathogens, and identify fungal pathogens to order or genus level;
- recognize several of the most common fungal plant pathogens;
- differentiate common patterns in disease development and control issues as they pertain to specific growing systems;
- use knowledge of pathogen biology and epidemiology to develop reasonable hypotheses about effective control strategies for fungal pathogens.

Course Texts:

Recommended: Plant Pathology 5th Ed. (2005) by G. N. Agrios, Elsevier Academic Press, Inc.

Required: Journal articles will be assigned throughout the course. These will be made available through the class website. **A Reading List is attached.**

Exams and Grading: There will be three lecture exams: two in-class, non-cumulative exams, plus one cumulative final exam, to be held during the university-scheduled final exam period. There will also be regular lab assignments and a short quiz at least once each week.

Quizzes: Quizzes will be unannounced, and will be given at the beginning of class or lab periods. They will be open-book, but students will have a limited time to complete the questions. If you arrive late, you will not be given additional time to complete the quiz, nor will make-up quizzes be given for unexcused absences. Quiz questions will come from recent lectures or assigned readings, and will be designed to reinforce key concepts and help prepare you for questions that will appear on the exams.

Course Grade

Your course grade will be based on the following assessments:

Assessment	Points
Exam I	100
Exam II	100
Exam III	150
Quizzes	50
Lab Assignments	100
Total Possible Points	500

Your course grade will be assigned as follows.

Letter Grade	Grade Points	Percentage	Assignment Points
A	4.0	90 or above	≥450
A-	3.67	87-89.9	435-449
B+	3.33	84-86.9	420-434
B	3.0	80-83.9	400-419
B-	2.67	77-79.9	385-399
C+	2.33	74-76.9	370-384
C	2.0	70-73.9	350-369
C-	1.67	67-69.9	335-349
D+	1.33	64-66.9	320-334
D	1.0	60-63.9	300-319
D-	0.67	57-59.9	285-299
E	0.0	56.9 or below	≤284

Class Attendance & Participation: Participation is a vital part of both the course experience and the course grade. Students will be expected to arrive at each class on time and prepared to fully participate in the lecture, lab, or other class activities. If you must miss a class due to illness or other extenuating circumstances, notify the instructor as soon as possible. Student athletes will be excused for official events through the University Athletic Association. Absences due to personal planning (leaving town, attending club functions, picking someone up at the airport, etc.) will not be excused, and missed points may not be made up.

Make-up Work: If you are ill on an exam day, notify the instructor as soon as you are able, and a make-up exam will be scheduled for you. If you must miss an exam for any other reason, please make arrangements ahead of time to reschedule. In most cases, **laboratory**

exercises may not be made up. Laboratory cultures, demonstrations, and other materials are typically prepared in advance, often ephemeral or expendable by nature, and cannot be easily recreated. If you absolutely must miss a lab, it is particularly important to notify the instructor before the end of the missed lab period, so that at least some of the demonstration materials may be set aside for you to view later.

Academic Integrity standards will be upheld vigilantly at all times in this class. Upon registering at the University of Florida, you signed the following statement: "I understand that 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." 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." You will be expected to keep these commitments in every aspect of your participation in this class.

UNIVERSITY POLICIES AND SERVICES

UF Counseling Services provides resources on campus for students having difficulties which may interfere with their academic performance. Programs are available for general therapy, stress management, anger management, math confidence, career counseling, LGBT support, and many other specific needs. Resources available to you include: 1) University Counseling Center, 301 Peabody Hall, 392-1575; 2) Student Mental Health Center, 392-1171; 3) Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161; 4) Career Resource Center, Reitz Union, 392-1601.

Accommodations are available for students with disabilities. Students requesting classroom accommodation must first register with the Dean of Students Office (through Students with Disabilities Office, Peabody 202, 392-1261). The Dean of Students Office will provide documentation to the student. This documentation must be presented to the instructor when requesting accommodation. For further information, see the Disability Resource Center (www.dso.ufl.edu/OSD/).

Software Use and 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.

THE INSTRUCTOR RESERVES THE RIGHT TO CHANGE OR MODIFY INFORMATION PROVIDED IN THE SYLLABUS. CLASS ANNOUNCEMENTS SUPERSEDE SYLLABUS STATEMENTS.

PLP4260 Fungal Plant Pathogens
Spring 2014

Course Schedule (Tentative)

Date	Day	#	Topic
Mar 10	M	Lecture 1	Ways of Being: Plant-Fungal Interactions <ul style="list-style-type: none"> • Mutualism-parasitism continuum • Mycorrhizae • Epiphytes & Endophytes • Biotrophs, hemibiotrophs, and necrotrophs
Mar 11	T	Lab 01	Plant-Fungal Interactions <ul style="list-style-type: none"> • Endo- and Ecto-Mycorrhizae • Epiphytes and Endophytes • Pathogens: Spots, blights, wilts, root rots, damping-off
Mar 12	W	Lecture 2	Adaptations for Pathogenicity <ul style="list-style-type: none"> • Obligate vs. opportunistic pathogens • Pathogenicity factors
Mar 13	R	Discussion 1	• Readings and Lecture Discussion
Mar 13	R	Lab 02	Isolating fungi from plant material <ul style="list-style-type: none"> • Techniques • Selective media
Mar 14	F	Lecture 3	Groups of Fungal Pathogens <ul style="list-style-type: none"> • Review of fungal orders & Stramenopiles • Taxonomic vs. functional groups
Mar 17	M	Lecture 4	Stramenopiles: Taxonomy, Biology, and Ecology
Mar 18	T	Lab 03	Isolation and maintenance of fungal cultures <ul style="list-style-type: none"> • Types and purposes of various fungal storage methods
Mar 19	W	Lecture 5	Chytrids: Taxonomy, Biology, and Ecology <ul style="list-style-type: none"> • Chytrid pathogens & pathogen vectors • Chytrid mycoparasites
Mar 20	R	Discussion 2	• Readings and Lecture Discussion
Mar 20	R	Lab 04	Stramenopile pathogens: the Oomycetes <ul style="list-style-type: none"> • <i>Pythium</i> vs. <i>Phytophthora</i> • Downy mildews
Mar 21	F	Exam	Exam I
Mar 24	M	Lecture 6	Zygomycetes: Taxonomy, Biology, and Ecology
Mar 25	T	Lab 05	Chytrid & Zygomycete pathogens <ul style="list-style-type: none"> • Chytrids in natural, agricultural, and landscape settings • Zygomycetes: field and postharvest rotters
Mar 26	W	Lecture 7	Ascomycetes: Taxonomy, Biology, and Ecology
Mar 27	R	Discussion 3	• Readings and Lecture Discussion

Mar 27	R	Lab 06	Ascomycete pathogens <ul style="list-style-type: none"> • Structures & Functions • Recognizing an Ascomycete
Mar 28	F	Lecture 8	Basidiomycetes: Taxonomy, Biology, and Ecology
Mar 31	M	Lecture 9	Fungal Disease Cycles and Epidemiology <ul style="list-style-type: none"> • Disease progress curves • Polycyclic vs. Monocyclic diseases • Inoculum density and inoculum potential
Apr 01	T	Lab 07	Ascomycete pathogens, ct. <ul style="list-style-type: none"> • Sexual and asexual ascomycetes • Conidial structures and identification
Apr 02	W	Lecture 10	Fungi in the Air: Airborne pathogens and Foliar diseases
Apr 03	R	Discussion 4	• Readings and Lecture Discussion
Apr 03	R	Lab 08	Basidiomycete pathogens <ul style="list-style-type: none"> • Structures & functions • Recognizing a Basidiomycete
Apr 04	F	Lecture 11	Soilborne Fungal Pathogens
Apr 07	M	Exam	Exam II
Apr 08	T	Lab 09	Isolating fungi from soil <ul style="list-style-type: none"> • Dilution plating • Sclerotia
Apr 9	W	Lecture 12	Fungal Pathogens in Row Crops vs. Perennial Crops
Apr 10	R	Discussion 5	• Readings and Lecture Discussion
Apr 10	R	Lab 10	Common pathogens of row crops
Apr 11	F	Lecture 13	Farm to Fork with Fungal Toxins & Mycotoxins
Apr 14	M	Lecture 14	Diseases in Perennial Crops
Apr 15	T	Lab 11	Perennial crop diseases
Apr 16	W	Lecture 15	Forest Pathology & Pathogen Ecology
Apr 17	R	Discussion 6	• Readings and Lecture Discussion
Apr 17	R	Lab 12	Ornamentals & Forest Diseases
Apr 18	F	Lecture 16	• Diseases in Ornamental Plants
Apr 21	M	Lecture 17	Control of Fungal Diseases <ul style="list-style-type: none"> • Whetzel's principles of plant disease control • Cultural controls
Apr 22	T	Lab 13	TBD/ Wrap-up
Apr 23	W	Lecture 18	Chemical Control of Fungal Diseases <ul style="list-style-type: none"> • Classes of chemicals and their modes of action • Chemical Resistance • IPM
May 01	R	Exam	Final Exam 10AM

Reading List for PLP 4260 (tentative, subject to change)

Lab #	Reading
01	Bidartondo, Dawn of symbiosis between plants and fungi.pdf
01	Johnson, Functioning of mycorrhizal associations along the mutualism-parasitism continuum.pdf
02	Jaroszuk-S'ciset, Activities of CWDE.pdf
02	Thomma, Alternaria saprophyte to parasite.pdf
03*	Rossmann, Systematics of Plant Pathogenic Fungi.pdf
04	Beakes, Evolutionary phylogeny of oomycetes.pdf
04	Kroon, Genus Phytophthora Anno 2012.pdf
05	Hwang, Plasmodiophora brassicae review.pdf
05*	Fry, Transmission of TNV by Olpidium.pdf
06	Hanson, Interaction of Rhizoctonia & Rhizopus.pdf
06	White, Phylogeny of the Zygomycota.pdf
07	Schoch, Ascomycota tree of life.pdf
08	Binder and Hibbett, Boletales.pdf
08	Lutz&Baur, Double Life of a Fungus.pdf
09*	Beltran, Epidemiology of Monosporascus root rot.pdf
09*	Montes-Borrego, Role of oospores as primary inoculum.pdf
10	Paul, Rain splash dispersal of Gibberella.pdf
10	Trail, Fungal cannons- explosive spore discharge in ascomycota.pdf
11	Duniway, Movement of Zoospores of Phytophthora in soils.pdf
11*	Subbarao, Effects of Deep Plowing on Scleroninia minor.pdf

Beakes, G.W., and S. Sekimoto. 2008. The Evolutionary Phylogeny of Oomycetes—Insights Gained from Studies of Holocarpic Parasites of Algae and Invertebrates. *In* Oomycete Genetics and Genomics: Diversity, Interactions, and Research Tools. K. Lamour and S. Kamoun, editors. John Wiley & Sons, Inc. 1–24.

Beltrán, R., A. Vicent, J. García-Jiménez, and J. Armengol. 2008. Comparative Epidemiology of *Monosporascus* Root Rot and Vine Decline in Muskmelon, Watermelon, and Grafted Watermelon Crops. *Plant Disease*. 92:158–163.

Bidartondo, M.I., D.J. Read, J.M. Trappe, V. Merckx, R. Ligrone, and J.G. Duckett. 2011. The Dawn of Symbiosis Between Plants and Fungi. *Biol. Lett.* 7:574–577.

Duniway, J.M. 1976. Movement of Zoospores of *Phytophthora cryptogea* in Soils of Various Textures and Matric Potentials. *Phytopathology*. 66:877.

Fry, P.R., and R.N. Campbell. 1966. Transmission of a tobacco necrosis virus by *Olpidium brassicae*. *Virology*. 30:517–527.

Hanson, L.E. 2010. Interaction of *Rhizoctonia solani* and *Rhizopus stolonifer* Causing Root Rot of Sugar Beet. *Plant Disease*. 94:504–509.

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- Jaroszuk-Scisel, J., E. Kurek, A. Slomka, M. Janczarek, and B. Rodzik. 2011. Activities of cell wall degrading enzymes in autolyzing cultures of three *Fusarium culmorum* isolates: growth-promoting, deleterious and pathogenic to rye (*Secale cereale*). *Mycologia*. 103:929–945.
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- Schoch, C.L., G.-H. Sung, F. López-Giráldez, J.P. Townsend, J. Miadlikowska, V. Hofstetter, B. Robbertse, P.B. Matheny, F. Kauff, Z. Wang, C. Gueidan, R.M. Andrie, K. Trippe, L.M. Ciuffetti, A. Wynns, E. Fraker, B.P. Hodkinson, G. Bonito, J.Z. Groenewald, M. Arzanlou, G. Sybren De Hoog, P.W. Crous, D. Hewitt, D.H. Pfister, K. Peterson, M. Gryzenhout, M.J. Wingfield, A. Aptroot, S.-O. Suh, M. Blackwell, D.M. Hillis, G.W. Griffith, L.A. Castlebury, A.Y. Rossmann, H.T. Lumbsch, R. Lücking, B. Büdel, A. Rauhut, P. Diederich, D. Ertz, D.M. Geiser, K. Hosaka, P. Inderbitzin, J. Kohlmeyer, B. Volkmann-Kohlmeyer, L. Mostert, K. O'Donnell, H. Sipman, J.D. Rogers, R.A. Shoemaker, J. Sugiyama, R.C. Summerbell, W. Untereiner, P.R. Johnston, S. Stenroos, A. Zuccaro, P.S. Dyer, P.D. Crittenden, M.S. Cole, K. Hansen, J.M. Trappe, R. Yahr, F. Lutzoni, and J.W. Spatafora. 2009. The Ascomycota Tree of Life: A Phylum-Wide Phylogeny Clarifies the Origin and Evolution of Fundamental Reproductive and Ecological Traits. *Syst Biol*. 58:224–239.
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