

PLP6262 Fungal Plant Pathogens/PLP4260 Introduction to Plant Pathogenic Fungi
Fall 2025

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Teaching Assistants: Christ Mane Belizaire

Class Location: 2306 Fifield Hall and online via Zoom
<https://ufl.zoom.us/j>

Class Times: 7 week module: January 12 to March 2, 2026
Lectures: MF period 5 (11:45-12:35 pm); W period 5-6 (11:45- 1:40 pm)
Labs: TR period 5-6 (11:45- 1:40 pm)

Class Website: <http://elearning.ufl.edu/> (e-Learning in Canvas)

Office Hours: By appointment

Class Recordings: Within the Canvas e-Learning site

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 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 PLP4260C: Introduction to Plant Pathogenic Fungi. Students enrolled in the graduate course will have 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 and genus level;
- recognize several of the most common fungal plant pathogens and understand key aspects of their biology and lifecycles that distinguish them;
- differentiate patterns in disease development and control strategies as they pertain to specific growing systems;
- use knowledge of pathogen biology and epidemiology to develop reasonable hypotheses about effective long and short term control strategies for fungal pathogens.

Course Texts:

Recommended: **Plant Pathology 5th Edition** (2005) by G. N. Agrios, Elsevier Academic Press, Inc.; **Mycology Guide: Key Terms and Concepts, 2nd Edition**, by N. Vargas et al., APS Press

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, non-cumulative lecture-lab exams. There will also be regular lab assignments, seven short quizzes throughout the term, and a Fungal Biology Oral Presentation.

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.

Fungal Biology Presentation: Each student will develop and present a PowerPoint talk on a topic of fungal biology. Additional information concerning project requirements and due dates can be found on page 5.

Course Grade

Your course grade will be based on the following assessments:

Assessment	Points
Exam I	100
Exam II	100
Exam III	100
Quizzes	35
Lab Assignments	65
Oral Presentation	50
Total Possible Points	450

Your course grade will be assigned as follows.

Letter Grade	Grade Points	Percentage	Assignment Points
A	4.0	90 or above	≥405
A-	3.67	87-89.9	392-404
B+	3.33	84-86.9	378-391
B	3.0	80-83.9	360-377
B-	2.67	77-79.9	347-359
C+	2.33	74-76.9	333-346
C	2.0	70-73.9	315-332
C-	1.67	67-69.9	302-314
D+	1.33	64-66.9	288-301
D	1.0	60-63.9	270-287
D-	0.67	57-59.9	257-269
E	0.0	56.9 or below	≤256

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 and work on later.

Grades and Grade Points: More information on UF grading policy may be found at
[UF Graduate Catalog](#)
[Grades and Grading Policies](#)

Academic Policies and Campus Resources

Please follow this link (<https://go.ufl.edu/syllabuspolicies>) for up-to-date UF academic policies and resources regarding :

- Accommodations for Students with Disabilities
- Academic Honesty
- UF Counseling Services (University Counseling Center; Student Mental Health, Sexual Assault Recovery Services: Career Resource Center)
- Software Use
- UF Policy on E-Mail
- Online Course Evaluation Process
- Academic Honesty:
- Services for Students with Disabilities
- E-learning technical support
- Other Policies and Resources

Fungal Biology Oral Presentation Information

Topic Selection

Each student will develop and present a **20 min oral presentation** on a fungal biology topic. Topics may be chosen from the spreadsheet list found on the class website or a topic of your own choosing with approval from the instructor. Topics will be claimed on a first-requested–first-assigned basis. You will sign up by e-mailing me directly with the topic that you have chosen. I will update and post the spreadsheet in the order that I receive the e-mail requests. I will send an e-mail confirmation when I have approved your choice. Once someone has signed up for a particular topic, no other student will be permitted to present on this topic. **A topic must be chosen by the end of lecture on February 9.** Sign up early if you have a topic you are particularly interested in! **Presentations will begin on February 17.** The order of presentations will be chosen at random.

Presentation Style and Length

Length: 20 min; an extra five minutes will be available for questions.

Format: PowerPoint

Organization: A title slide including the topic and your name is required. Background/introductory information is expected. A clear and concise explanation of the topic is expected. Examples of how the topic advances understanding of biology (fungal or otherwise) or is applied to managing disease, improving ecosystems, producing useful products, etc is expected. Presentation of information from a recently published paper concerning the topic may be helpful. A summary of key take-away points should be obvious and emphasized.

Style: These presentations are intended to be mini topical lectures. Your audience is Graduate and Doctor of Plant Medicine students.

Exam question: Each presenter will create one multiple-choice question pertaining to his/her presentation topic. You should e-mail this question to me (rollinsi@ufl.edu) after your presentation is given.

Resources and References

Every source of data, pictures, text, information, etc. used in your presentation should be cited on the slide. If too many for each slide, include a reference list at the end.

Due Dates

A pdf copy of your presentation is due by the end of the class period on the day of your presentation. A submission portal will be created on the class website for you to upload a pdf copy of your presentation.

Grading

Your presentation is worth 50 points assigned by the instructor: 20 points for structure (organization of slides and presentation, turned in on time, etc.), 5 points for presentation style, and 25 points for accuracy of information.

PLP6262 Fungal Plant Pathogens

Spring 2025

Course Schedule (Tentative)

Date	Day	#	Topic
Jan 12	M	Lecture 1	<p>Ways of Being: Plant-Fungal Interactions</p> <ul style="list-style-type: none"> • Mutualism-parasitism continuum • Mycorrhizae • Epiphytes & Endophytes • Biotrophs, hemibiotrophs, and necrotrophs
Jan 13	T	Discussion 01	<p>Course Overview</p> <ul style="list-style-type: none"> • Syllabus, Schedule, Objectives, Assessments
Jan 14	W	Lecture 2	<p>Adaptations for Pathogenicity</p> <ul style="list-style-type: none"> • Obligate vs. opportunistic pathogens • Pathogenicity factors
Jan 14	W	Discussion 02	<p>Plant-Fungal Interactions</p> <ul style="list-style-type: none"> • Endophytes <p>Working with Fungal Pathogens</p> <p>Storage methods</p>
Jan 15	Th	Lab 01	<ul style="list-style-type: none"> • Microscopy Basics: Know your Microscope • Isolation and maintenance of fungal culture • Selective Media and Storage Methods
Jan 16	F	Lecture 3	<p>Groups of Fungal Pathogens</p> <ul style="list-style-type: none"> • Review of fungal orders & Stramenopiles • Taxonomic vs. functional groups
Jan 19	M	Holiday	NO CLASS
Jan 20	T	Lab 01 cont.	<ul style="list-style-type: none"> • Microscopy Basics: Use your microscope
Jan 21	W	Lecture 4 & Discussion 03	<ul style="list-style-type: none"> • Stramenopiles: Taxonomy, Biology, and Ecology • Readings and Lecture Discussion
Jan 22	Th	Lab 02	<p>Stramenopile pathogens: the Oomycetes</p> <ul style="list-style-type: none"> • <i>Pythium</i> vs. <i>Phytophthora</i> • Downy mildews
Jan 23	F	Lecture 5	<p>Chytrids: Taxonomy, Biology, and Ecology</p> <ul style="list-style-type: none"> • Chytrid pathogens & pathogen vectors <p>Chytrid mycoparasites</p>
Jan 26	M	Lecture 6	Mucromycota: Taxonomy, Biology, and Ecology
Jan 27	T	Lab 03	<p>Chytrid & Mucormycota pathogens</p> <ul style="list-style-type: none"> • Chytrids in natural, agricultural, and landscape settings <p>Mucormycetes: field and postharvest rotters</p>
Jan 28	W	Lecture 7	Ascomycota: Taxonomy, Biology, and Ecology
Jan 29	Th	Exam	Exam I
Jan 30	F	Lecture 7 cont.	Ascomycota: Taxonomy, Biology, and Ecology continued
Feb 2	M	Lecture 8	Basidiomycota: Taxonomy, Biology, and Ecology
Feb 3	T	Lab 04	<p>Ascomycota pathogens</p> <ul style="list-style-type: none"> • Structures & Functions • Recognizing an Ascomycete

Feb 4	W	Lecture 7-8	Ascomycota – Basidiomycota cleanup • Readings and Lecture Discussion
Feb 5	Th	Lab 05	Ascomycota pathogens, cont. • Sexual and asexual ascomycetes Conidial structures and identification
Feb 6	F	Lecture 09	Fungal Disease Cycles and Epidemiology • Disease progress curves • Polycyclic vs. Monocyclic diseases • Inoculum density and inoculum potential
Feb 9	M	Lecture 10	• Fungi in the Air: Airborne pathogens and Foliar diseases
Feb 10	T	Lab 06	Basidiomycota pathogens • Structures & functions Recognizing a Basidiomycete
Feb 11	W	Lecture 11 & Discussion 05	Soilborne Fungal Pathogens Readings and Lecture Discussion
Feb 12	Th	Review	Exam Review
Feb 13	F	Exam	Exam II
Feb 16	M	Lecture 12	Fungal Pathogens in Row Crops vs. Perennial Crops
Feb 17	T	Presentations	Presentations 1-4
Feb 18	W	Lecture 13	Diseases in Perennial Crops
Feb 19	Th	Presentations	Presentations 5-8
Feb 20	F	Lecture 14	Forest Pathology & Pathogen Ecology
Feb 23	M	Lecture 15	Diseases in Ornamental Plants
Feb 24	T	Presentations	• Presentations 8-11
Feb 25	W	Lecture 16	Management of Fungal Diseases • Whetzel's principles of plant disease control Cultural controls
Feb 26	Th	Lecture 17	Chemical Control of Fungal Diseases • Classes of chemicals and their modes of action Chemical Resistance
Feb 27	F	Review	• Optional Exam Review
Mar 2	M	Exam	Exam III

Reading List for PLP6905 (6262) (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
01	Redman, Fungal Symbiosis from mutualism to parasitism.pdf
01*	Elliot_Longterm_Storage.pdf
01*	Woodward_Symbiogenics.pdf
01	Xia_Culturable_Endophytes.pdf
01	Kuo, Secret lifestyles of <i>Neurospora crassa</i> .
02	DeZwaan, <i>Magnaporthe grisea</i> pth11p.pdf
02	Jaroszuk-Scisel, Activities of CWDE.pdf
02	Thomma, <i>Alternaria</i> saprophyte to parasite.pdf
02	Schafer, One enzyme makes a fungal pathogen.pdf
03	Rossmann, Systematics of Plant Pathogenic Fungi.pdf
03	Taylor, One Fungus = One Name
03	Hawksworth, The Amsterdam Declaration on Fungal Nomenclature
03	Crous, Identifying and Naming Plant-Pathogenic Fungi_Past, Present, and Future
04	Beakes, Evolutionary phylogeny of oomycetes.pdf
04	Ivors, Microsatellite markers identify lineages of <i>P. ramorum</i> .pdf
04	Kroon, Genus <i>Phytophthora</i> Anno 2012.pdf
04	Nelson, Rhizosphere regulation of oomycete pathogens.pdf
04	vanWest, Oomycete Plant Pathogens use Electric Fields.pdf
05	Hwang, <i>Plasmodiophora brassicae</i> review.pdf
05	Kanyuka, <i>Polymyxa graminis</i> .pdf
05	Fry, Transmission of TNV by <i>Olpidium</i> .pdf
06	Hanson, Interaction of <i>Rhizoctonia</i> & <i>Rhizopus</i> .pdf
06	Holmes, Influence of wound type on <i>Rhizopus</i> soft rot.pdf
06	Partida-Martinez, Pathogenic fungus harbours endosymbiotic bacteria.pdf
06	Spatafora, Phylogenetic classification of zygomycete.pdf
07	Schoch, Ascomycota tree of life.pdf
08	Binder and Hibbett, Boletales.pdf
08	Lutz&Baur, Double Life of a Fungus.pdf
09	Scott, Spatiotemporal analysis of epiphytotics of downy mildew.pdf
09*	Beltran, Epidemiology of <i>Monosporascus</i> root rot.pdf
09*	Montes-Borrego, Role of oospores as primary inoculum.pdf
10	Noblin, Surface tension propulsion of fungal spores.pdf
10	Paul, Rain splash dispersal of <i>Gibberella</i> .pdf
10	Stolze-Rybczynski, Adaptation of spore discharge in basidiomycota.pdf
10	Trail, Fungal cannons- explosive spore discharge in ascomycota.pdf
11	Allen&Newhook, Chemotaxis of zoospores to ethanol in capillaries.pdf
11	Dobbs&Gash, Microbial and Residual Mycostasis.pdf
11	Duniway, Movement of Zoospores of <i>Phytophthora</i> in soils.pdf
11	Garcia-Garza, Fusox spore movement through soil.pdf
11	MacDonald&Duniway, Influence of soil texture and temp on motility of <i>Phytophthora</i> .pdf
11*	Subbarao, Effects of Deep Plowing on <i>Scleronia minor</i> .pdf
14	Newhouse et al. - 2014 - Transgenic American chestnuts show enhanced blight.pdf
14	Multigene phylogeny of filamentous ambrosia fungi associated with ambrosia and bark beetles.pdf

Full bibliography of Reading List articles

Alamouti, S.M., Tsui, C. K. M., and Breuil, C. 2009. Multigene phylogeny of filamentous ambrosia fungi associated with ambrosia and bark beetles. *Mycol. Res.* 113:822–835.

Allen, R.N., and F.J. Newhook. 1973. Chemotaxis of zoospores of *Phytophthora cinnamomi* to ethanol in capillaries of soil pore dimensions. *Transactions of the British Mycological Society*. 61:287–IN12.

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.

Crous, P.W., D.L. Hawksworth, and M.J. Wingfield. 2015. Identifying and Naming Plant-Pathogenic Fungi: Past, Present, and Future. *Annual Review of Phytopathology*. 53:247–267.

DeZwaan, T.M., A.M. Carroll, B. Valent, and J.A. Sweigard. 1999. *Magnaporthe grisea* pth11p is a novel plasma membrane protein that mediates appressorium differentiation in response to inductive substrate cues. *Plant Cell*. 11:2013–2030.

Dobbs, C.G., and M.J. Gash. 1965. Microbial and Residual Mycostasis in Soils. , *Published online*: 25 September 1965; | doi:10.1038/2071354a0. 207:1354–1356.

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

Elliott, M.L., 2005. Survival, growth and pathogenicity of *Gaeumannomyces graminis* var. *graminis* with different methods of long-term storage. *Mycologia* 97, 901–907. <https://doi.org/10.3852/mycologia.97.4.901>

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

Gracia-Garza, J.A., and D.R. Fravel. 1998. Effect of Relative Humidity on Sporulation of *Fusarium oxysporum* in Various Formulations and Effect of Water on Spore Movement Through Soil. *Phytopathology*. 88:544–549.

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

Hawksworth, D.L., P.W. Crous, S.A. Redhead, et al. 2011. The Amsterdam Declaration on Fungal Nomenclature. *IMA Fungus*. 2:105–112.

Holmes, G.J., and R.R. Stange. 2002. Influence of Wound Type and Storage Duration on Susceptibility of Sweetpotatoes to *Rhizopus* Soft Rot. *Plant Disease*. 86:345–348.

Hwang, S.-F., S.E. Streikov, J. Feng, B.D. Gossen, and R.J. Howard. 2011. *Plasmiodiophora brassicae*: a review of an emerging pathogen of the Canadian canola (*Brassica napus*) crop. *Molecular Plant Pathology*. 13:105–113.

Ivors, K., M. Garbelotto, I.D.E. Vries, C. Ruyter-Spira, B. Te Hekkert, N. Rosenzweig, and P. Bonants. 2006. Microsatellite markers identify three lineages of *Phytophthora ramorum* in US nurseries, yet single lineages in US forest and European nursery populations. *Mol. Ecol.* 15:1493–1505.

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.

Johnson, N.C., J.-H. Graham, and F.A. Smith. 2008. Functioning of mycorrhizal associations along the mutualism–parasitism continuum. *New Phytologist*. 135:575–585.

Kanyuka, K., E. Ward, and M.J. Adams. 2003. *Polymyxa graminis* and the cereal viruses it transmits: a research challenge. *Molecular Plant Pathology*. 4:393–406.

Kroon, L.P.N.M., H. Brouwer, A.W.A.M. de Cock, and F. Govers. 2012. The genus *Phytophthora* anno 2012. *Phytopathology*. 102:348–364.

Kuo, H.-C., Hui, S., Choi, J., Asiegbu, F. O., Valkonen, J. P. T., and Lee, Y.-H. 2014. Secret lifestyles of *Neurospora crassa*. *Sci. Rep.* 4:1-6.

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Lutz, M., R. Bauer, and F. Oberwinkler. 2007. The Double Life of a Fungus. *German Research*. 29:21–23.

MacDonald, J.D. 1978. Influence of soil texture and temperature on the motility of *Phytophthora cryptogea* and *P. megasperma* Zoospores. *Phytopathology*. 68:1627.

Montes-Borrego, M., B.B. Landa, J.A. Navas-Cortés, F.J. Muñoz-Ledesma, and R.M. Jiménez-Díaz. 2009. Role of oospores as primary inoculum for epidemics of downy mildew caused by *Peronospora arborescens* in opium poppy crops in Spain. *Plant Pathology*. 58:1092–1103.

Nelson, E.B. Rhizosphere Regulation of Preinfection Behavior of Oomycete Plant Pathogens. In *Microbial Activity in the Rhizosphere*. K.G. Mukerji, C. Manoharachary, and J. Singh, editors. Springer-Verlag, Berlin/Heidelberg. 311–343.

Newhouse, A. E., Polin-McGuigan, L. D., Baier, K. A., Valletta, K. E. R., Rottmann, W. H., Tschaplinski, T. J., et al. 2014. Transgenic American chestnuts show enhanced blight resistance and transmit the trait to T1 progeny. *Plant Science*. 228:88–97.

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Redman, R.S., D.D. Dunigan, and R.J. Rodriguez. 2001. Fungal symbiosis from mutualism to parasitism: who controls the outcome, host or invader? *New Phytologist*. 151:705–716.

Rossman, A.Y., and M.E. Palm-Hernández. 2008. Systematics of Plant Pathogenic Fungi: Why It Matters. *Plant Disease*. 92:1376–1386.

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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. Ciufetti, 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. Rossman, 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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Xia, Y., Sahib, M.R., Amna, A., Opiyo, S.O., Zhao, Z., Gao, Y.G., 2019. Culturable endophytic fungal communities associated with plants in organic and conventional farming systems and their effects on plant growth. *Sci Rep* 9, 1669.