

**Syllabus for PLP 4260C – Introduction to Plant Pathogenic Fungi (4 credits)**  
**PLP 6262C – Fungal Plant Pathogens (4 credits)**  
Spring - 2006

**Instructor:** Dr. Carol Stiles

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**Office hours:** 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. If you need to discuss a specific issue, please call or send an e-mail to set up an appointment.

**Class Format and Meeting Times:** The class will meet for lecture and laboratory during periods 2-4 (8:30 a.m. – 11:30 a.m.) on Tuesdays and Thursdays in Fifield Hall Rm. 2306. Because different students work at different paces, additional time outside normal laboratory hours may be required to complete lab exercises.

**Objectives:** This course focuses on the biology of fungi associated with plants, including plant pathogens, saprotrophs and other symbioses (e.g., mycorrhizae and endophytes). At the end of this course the student should be familiar with: 1) how to recognize the major groups of fungi and how to use keys to identify a particular organism at least to genus; 2) the basic biology of fungal organisms in association with plants, 3) examples of plant diseases and other interactions involving fungi from the major taxonomic groups, and 4) how pathogens cause disease, including an introduction to molecular mechanisms of pathogenicity. In other words, we will learn about fungal life cycles, fungal growth, development, reproduction, survival and dispersal, taxonomy, genetics, pathogenicity and other interactions of fungi with plants.

**Prerequisite:** General Plant Pathology (PLP 3002/5005) or Introductory Mycology (PLP 5656).

**Grading:** The course grade will be based on three exams (100 points each) and laboratory and student activities (see next page). Exam format may include short answer, problem-solving or essay questions, and may include material from the reading and student presentations, as well as the lab material, including identification of structures, genera, etc., from projected photos. Because material in second and third sections of the course builds upon introductory material, the exams may be considered cumulative, but will focus on material covered since the last exam. The approximate point distribution will be:

Exams	300 pts	A = 90 – 100%
Laboratory notebook	100	B = 80 – 89.9%
Lab collection	100	C = 70 – 79.9%
Fungal genus guide and presentation	100	D = 60 – 69.9%
Total	600 pts	Below 60% = E

**Textbooks:** Kendrick, B. 2000. *The Fifth Kingdom*. Newburyport, MA: Focus Publ.

Noyd, R.K. 2000. *Mycology Reference Cards*. St. Paul, MN: APS Press.

A lab notebook (bound, full-size, with plain paper, not 3-ring) will be required.

**Reading/reference material:** Additional reading and reference material will be provided. Some of these will be required reading (see the syllabus) for all students. Other articles will be designated as “readings-of-choice” – graduate students will be expected to read these and to select and answer questions about these articles on exams.

## Student activities and projects

A) Each student will maintain a **laboratory notebook** with his or her observations, experimental reports, and so on from the laboratory portion of the class; this notebook also will reflect the participation of the student in the laboratory. *You will need to obtain a bound (not loose-leaf) notebook with plain paper.* Notebooks will be graded on neatness, completeness, organization, format and so on. (Notebooks will be due **4 May 2006**). You should include: **A)** your observations of demonstration material from the laboratory: e.g., notes, drawings, descriptions of representative samples; **B)** your documentation of your unknowns (see below) and **C)** summary of experimental laboratory exercises, including: Introduction, Materials & Methods, Results, Conclusions. The Intro and M&M can be brief, i.e., it is not necessary to repeat all the detailed steps that may be included on lab handouts, but students should summarize results and write a conclusion. The lab notebook should not be typed! It should be an **ongoing daily (chronological) record** of what you do during the lab. (It should however be neat and organized!)

B) **Guide to a plant pathogenic fungus: 1) Outline:** each student will be responsible for compiling a guide for **one fungal genus** following the outline below. The guide will be based on scientific literature: a minimum of **seven** primary reference articles should be included, including **two** “current” articles - within the last two years; note that this is a *minimum* number (= C?). Students registered for PLP 4260 will need to include at least **two** primary journal articles. For those of you working on fungi in your research, you must, of course, choose a different organism. Topics to be covered in this guide include:

- I. Taxonomic status and phylogenetic history
- II. Host range and type of symptoms
- III. Life cycle and disease cycle
- IV. Detection, diagnosis and control
- V. Genetics and physiology
- VI. Pathogenesis
- VII. Literature cited

You will turn in an electronic <b>detailed outline</b> with complete list of cited references (this is not a term paper, but an <b>outline!</b> ) and an electronic <b>copy of your slides</b> (e.g., Powerpoint), overheads, etc.
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**2) Presentation:** each student will select a *single current topic* - from the primary current literature - about his/her fungal genus and give a 15 minute presentation during the appropriate section of the course.

C) Each student will be responsible for collecting and identifying (at least to genus) a collection of **microscopic plant-associated fungi**. Students registered for PLP 6262 will need to turn in **five** genera from three of the major groups of fungi, while students registered for PLP 4260 will turn in **two** genera. This may include the genus for which you are making your “guide” (see B above). You will document all steps in your lab notebook, beginning with the collection and all subsequent steps: observing microscopically, culturing, describing, and using literature and keys to identify the organism. Collections may be in plant tissue, but at least one pure culture must be submitted. A form will be provided to summarize/describe each collection. *The goal is to learn to identify fungi using microscopic characters*, not to collect fungi you already know. For those of you working on or who have worked with fungi in research, you must collect different organisms.

D) **Group experiments:** Three major projects will be carried out over the course of a few weeks during the semester. We will work on these experiments in groups, and will have a time period to discuss them near the end of the experiments. However, **each student** should include in his or her laboratory notebook, an experimental summary, as noted above, from **each experiment**. This is to insure that all students are participating and understand what is occurring throughout the semester, and to document the project for future reference.

(More details on each of these activities will be given in class and in handouts.)

## PLP 4260/6262 Fungal Plant Pathogens

### Tentative\* Schedule

Date/Week	Lecture topics*	Reading*	Lab topics/activities*
10 Jan	Characteristics of “fungi”	Noyd - 1*	Intro to lab – safety, etc.
12 Jan 1	Fungal hyphae – vegetative growth and multihyphal survival structures	Website 1** 146-150	Microscopy
17 Jan 19 Jan 2	Phylogeny, life cycles and spore types - Major groups of fungi	1-8 Noyd-1	<b>Examples of fungal groups</b> ↓
24 Jan 26 Jan 3	Fungal spores – reproductive growth -- spore release and dispersal	155-157 126-133+	↓
31 Jan 2 Feb 4	Fungal lifestyles – evolution of symbiosis – mutualism, parasitism, pathogenicity – trophic relationships  – mycorrhizae – endophytes	257-278 Saikkonen, 1998	Sterile technique – agar media, pure culture techniques, storage of fungi, inoculum production and inoculation. <b>Isolation of fungi</b> - general vs. semi- selective media ↓
7 Feb 9 Feb 5	Fungal lifestyles and disease cycles  <b>Exam I</b> Thurs., Feb. 9		<b>Fungal genus - choice due</b> ↓
14 Feb 16 Feb 6	Anamorph / teleomorph connections and mitosporic fungi → coelomycetes, hyphomycetes  Genetics of fungi	43-45 45-53	<b>Koch’s postulates/</b> disease cycle study ↓
21 Feb 23 Feb 7	Ascomycota → intro, Taphrinales, Sordariales, Diatrypales and Sphaeriales, (Xylariales), Hypocreales, Clavicipatales Diaporthales,	38-43, 53-77	→ <b>Genetics experiment</b> 159-173 ↓
28 Feb 2 Mar 8	Leotiales (Helotiales), Rhytismatales, , Erysiphales, Eurotiales, Ophiostomatales, (Microascales), Dothideales  Ascomycota – <i>student presentations</i>	Ditto	→ <b>Begin working on unknowns</b> - collecting ↓
7 Mar 9 Mar 9	Ascomycota – <i>student presentations</i> Basidiomycota → intro, Exobasidiales (+Agaricales, Lycoperdales, etc.)	78-81, 82	→
14 Mar 16 Mar	<i>Spring break!</i>		
21 Mar 23 Mar 10	Basidiomycota → Teliomycetes Uredinales, Ustilaginales  Basidiomycota - <i>student presentations</i>	103-108	→
28 Mar	<b>Exam II</b> Tues., 28 Mar		

30 Mar 11	Pathogenicity – molecular mechanisms	Idnurm and Howlett, 2001	
4 Apr 6 Apr 12	Pathogenicity, cont. Oomycota → Peronosporales	19-26	First two collections are due - <b>4 Apr</b> →
11 Apr 13 Apr 13	Oomycota - <i>student presentations</i> Zygomycota → Mucorales, Endogonales Glomeromycota	30-36	→
18 Apr 20 Apr 14	Chytridio-, Plasmodiophoromycota → Fungicide modes of action	12-19 216-221	<b>18 Apr - Fungal genus guides due</b>
25 Apr 15	Fungicide resistance	Dekker, 1995	<b>25 Apr – all collections due - wrap-up lab;</b>
<b>4 May Thursday</b>	<b>Exam III during final exam scheduled time, 5:30 – 7:30 p.m., 4 May</b>		<b>Lab notebooks are due at final exam period</b>

This symbol → indicates that we will be looking at examples of the corresponding fungal group in the laboratory portion of the class.

**\*Reading and reference notes:**

Noyd - 1 – refers to the first card in the *Mycology Reference Cards*, by R.K. Noyd. Students should also refer to each reference card for the appropriate fungal group.

Page numbers refer to Kendrick's *The Fifth Kingdom*;

See also accompanying website: <http://www.mycolog.com/fifhtoc.html>

\*\*Website 1: Apical growth of fungi - <http://helios.bto.ed.ac.uk/bto/microbes/apical.htm>

Additional reference material will be provided in the photocopy room and the Plant Medicine student office or as website links. Website links, announcements, reminders, etc. will be sent by e-mail – each student must maintain an accessible e-mail address throughout the semester.

**ATTENDANCE / PARTICIPATION:** Students are expected to attend all lectures and for the *duration* of laboratory periods, since being present for lectures and discussion and participating in laboratory is necessary for learning the material. Please note that it may not be possible to make up laboratory exercises if fresh material is used, and because the lab is frequently in use by other classes. **Please notify me** of an absence before class or as soon as possible, especially if an exam or exercise is scheduled for that day; arrangements for any makeup work need to be made within two days of the absence. It is the student's responsibility to obtain notes and handouts, if class or lab is missed.

Please follow guidelines for appropriate microscope use, be responsible for equipment that is checked out to you for use in the laboratory, treat books and references available during class with respect and care, and “clean up” after yourself. Failure to do so may result in the loss of use, and/or loss of points on the laboratory notebook portion of the class. Please do NOT remove reading materials or references from the teaching lab, the photocopy room, or the Plant Medicine student office.

## Additional Course Information and University 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.

**ACCOMMODATION:** Students requesting classroom accommodation must first register with the Dean of Students Office (Students with Disabilities Office, Peabody 202 at 352-392-1261). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Further information is available from the Disability Resource Center at <http://www.dso.ufl.edu/drp/>.

**ACADEMIC HONESTY:** As a result of completing the registration form at the University of Florida, every student has 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." We agree to comply with the new Honor Code, which specifies that "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."

*Note that excessive reliance on materials (e.g., cutting and pasting from internet sites or using just one or two main sources) without appropriate paraphrasing and citation is a form of plagiarism!*

**More importantly, this practice is unprofessional and does not demonstrate that the student has “synthesized” the material.** See also: notes on appropriate citation in handout and please read through the following websites. If you are not sure what constitutes plagiarism, please contact the instructor before starting your project. University policy regarding “Academic Honesty” is available from the Dean of Students Office 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 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.*

**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.

**UF Policy On E-Mail:** “Official University business email will be communicated to students using the University GatorLink email account. That is, official email will be sent exclusively to GatorLinkUserName@ufl.edu. The preferred email address recorded for all students will be the GatorLink address. This is the email address displayed in the online phonebook. It is the student’s responsibility to insure that e-mail address is maintained so that they receive official communications from the University.

**Finally:** Have a good semester! ;)

## Literature Sources for Fungi [Spring, 2006]

Students should read Ch. 12 Fungal Plant Pathology of Kendrick's *The Fifth Kingdom* early in the semester; this chapter is primarily a brief review of General Plant Pathology, and briefly introduces epidemiology, plant disease control, disease forecasting, and integrated pest management.

### General References:

- Kendrick, B. 2000. *The Fifth Kingdom*, 3<sup>rd</sup> ed. Newburyport, MA: Focus Publishing.
- Noyd, R.K. 2000. *Mycology Reference Cards*. St. Paul, MN: The American Phytopathological Society.
- Carlile, M.J., S.C. Watkinson, and G.W. Gooday. 2001. *The Fungi*, 2<sup>nd</sup> edition. San Diego or London: Academic Press.
- Alexopolous, C.J., Mims, C. and Blackwell, M. *Introductory Mycology*, 4<sup>th</sup> ed. 1996. New York: John Wiley & Sons
- Kirk, P.M., P.F. Cannon, J.C. David, and J.A. Stalpers. 2001. *Dictionary of the Fungi*, 9<sup>th</sup> ed. Wallingford, UK: CAB International. (The previous edition – 8<sup>th</sup> ed. - includes keys to families of various major groups, beginning on p. 497).
- Ulloa, M. and R.T. Hanlin. 2000. *Illustrated Dictionary of Mycology*. St. Paul, MN: The American Phytopathological Society.
- Rossman et al., 1987. *A Literature Guide for the Identification of Plant Pathogenic Fungi*, St. Paul, MN: The American Phytopathological Society.

### General key:

- Dugan, F.M. 2006. *The Identification of Fungi: An Illustrated Introduction with Keys, Glossary, and Guide to Literature*. St. Paul, MN: The American Phytopathological Society.

### Plasmodiophoromycota, Oomycota, and Chytridiomycota

- Fuller, M.S. and Jaworski, A. 1987. *Zoosporic fungi in teaching and research*. Athens, GA: Southeastern Publishing Co. (out-of-print?)

### Zygomycota

- O'Donnell, K.L. 1979. *Zygomycetes in culture*. Athens, GA: Dept. of Botany, University of Georgia. (out-of-print?)

### Ascomycota and Mitosporic Fungi

- Barnett, H.L. and B.B. Hunter. 1998. *Illustrated Genera of Imperfect Fungi*. St. Paul, MN: APS Press
- Hanlin, R.T. *Illustrated Genera of Ascomycetes*, (1990) and *Illustrated Genera of Ascomycetes*, Vol. II (1998) and *Combined Keys to Illustrated Genera of Ascomycetes*, Vol. I and II (1998). St. Paul, MN: APS Press.
- Ellis, M.B. 1971. *Dematiaceous Hyphomycetes*, and 1976. *More Dematiaceous Hyphomycetes*. Kew, Surrey, United Kingdom: Commonwealth Mycological Institute.
- Sutton, B.C. 1980. *The coelomycetes*. Slough, United Kingdom: Commonwealth Agricultural Bureaux.

### Basidiomycota

- Vanky, K. 2002. *Illustrated genera of smut fungi*. St. Paul, MN: APS Press
- Cummins, G.B. and Y. Hiratsuka, 3<sup>rd</sup> ed. 2003. *Illustrated genera of rust fungi*. St. Paul, MN: APS Press.