APPLICATION FOR NEW COURSE

1. Submitted by College of Agriculture Date November 4, 2004
Department/Division offering course Plant Pathology Department

2. Proposed designation and Bulletin description of this course

a. Prefix and Number PPA 500
b. Title* Physiology of Plant Health and Disease
   *NOTE: If the title is longer than 24 characters (including spaces), write
   A sensible title (not exceeding 24 characters) for use on transcripts
   Phys Plant Health Dis

c. Lecture/Discussion hours per week 2
d. Laboratory hours per week 0

c. Studio hours per week 0
f. Credits 2

g. Course description
Physiological and molecular aspects of plant biology underlying interactions with microbial pathogens and
symbionts.

h. Prerequisites (if any)
PPA 400G can be concurrent.

i. May be repeated to a maximum of N/A (if applicable)

4. To be cross-listed as N/A

5. Effective Date Fall 2005 (semester and year)

6. Course to be offered ☑ Fall ☐ Spring ☐ Summer

7. Will the course be offered each year? (Explain if not annually)
   ☑ Yes ☐ No

8. Why is this course needed?
Prepares graduate students for 600-level PPA courses. Introduces graduate and undergraduate students to
physiological and molecular aspects of plants, microbes, and their interactions.

9. a. By whom will the course be taught? Christopher Schardl

    b. Are facilities for teaching the course now available?
   If not, what plans have been made for providing them? ☑ Yes ☐ No

   N/A
APPLICATION FOR NEW COURSE

10. What enrollment may be reasonably anticipated? 7

11. Will this course serve students in the Department primarily? ☑ Yes ☐ No
   Will it be of service to a significant number of students outside the Department? ☑ Yes ☐ No
   Advanced undergraduates and graduate students enrolled in PPA 400G may enhance their training by concurrent
   or subsequent enrollment in PPA 500.

   Will the course serve as a University Studies Program course? ☐ Yes ☑ No
   If yes, under what Area? N/A

12. Check the category most applicable to this course
   ☐ traditional; offered in corresponding departments elsewhere;
   ☐ relatively new, now being widely established
   ☐ not yet to be found in many (or any) other universities

13. Is this course applicable to the requirements for at least one degree or certificate at the
    University of Kentucky? ☑ Yes ☐ No

14. Is this course part of a proposed new program:
    If yes, which? ☐ Yes ☑ No

15. Will adding this course change the degree requirements in one or more programs?*
    If yes, explain the change(s) below
    PPA 500 will be required for M.S. and Ph.D. in Plant Pathology.
    ☑ Yes ☐ No

16. Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used.

17. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has
    been consulted. ☐

18. If the course is 400G or 500 level, include syllabi or course statement showing differentiation for undergraduate and graduate
    students in assignments, grading criteria, and grading scales. ☑

19. Within the Department, who should be contacted for further information about the proposed course?
    Name Christopher Schardt Phone Extension 257-7445x80730

*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.
APPLICATION FOR NEW COURSE

Signatures of Approval:

[Signatures]

Department Chair

[Signature]

Dean of the College

[Signature]

4/22/05

Date

[Signature]

4/26/05

Date

[Signature]

4/17/05

Date of Notice to the Faculty

*Undergraduate Council

Date

*University Studies

Date

*Graduate Council

Date

*Academic Council for the Medical Center

Date

*Senate Council (Chair)

Date

Date of Notice to University Senate

*If applicable, as provided by the Rules of the University Senate

ACTION OTHER THAN APPROVAL.

Rev 3/04
PPA 500, Physiology of Plant Health and Disease  
Syllabus

- **Semesters taught:** Every Fall  
- **Credit hours:** 2  
- **Day/Time:** Tuesdays, 1-2:50 p.m.  
- **Prerequisite:** PPA 400G prereq or concurrent  
- **Required for:**  
  - Plant Pathology PhD  
  - Plant Pathology MS  
- **Instructor:** C.L. Schardl  
- **Text:** Taiz & Zeiger, Plant Physiology, 3rd ed. 2002. Web topics and web essays are available via <www.plantphys.net>  
- **Major teaching objectives:** To provide first-semester graduate students and upperclass undergraduates with a sophisticated appreciation of the interactions of plants with microbes, viruses and the environment. The course focuses on physiological, biochemical and genetic aspects of these interactions. We will explore how microbes may promote or degrade plant health; how plant viruses transmit, replicate and cause disease; how plants respond to biotic and abiotic stresses; how plants defend against pathogens; and modern approaches to disease management and risk assessment.  
- **Topics:**

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1</td>
<td>Overview of plant-microbe-environment interactions; Plant anatomy</td>
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<tr>
<td>2</td>
<td>Plant cell structure; Plant genomes and gene expression; Micro-RNA; RNAi</td>
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<td>3-4</td>
<td>Water; Solutes; Plant vascular system</td>
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<td>5</td>
<td>Rhizosphere biology; Mycorrhizae; Rhizobia; N-fixation</td>
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<td>6</td>
<td>Cell walls and matrix: Structures, Degradation, Endogenous elicitors</td>
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<td>7-8</td>
<td>Plant energetics; Lipid metabolism; Reactive oxygen species; Programmed cell death</td>
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<td>9-10</td>
<td>Defense molecules/signals</td>
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<td>11-12</td>
<td>Gene expression and signal transduction in plants and microbes;</td>
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<td>13-14</td>
<td>Plant development; Plant growth regulators/hormones; Stress responses</td>
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<tr>
<td>15</td>
<td>Plant virology; Introduction; Genomes and structures of viruses</td>
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<td>16</td>
<td>Infection cycles: Plus-stranded RNA viruses</td>
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<tr>
<td>17</td>
<td>Infection cycles: DNA viruses; Minus-strand RNA viruses</td>
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<td>18</td>
<td>Vector transmission of plant viruses</td>
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<tr>
<td>19</td>
<td>Bacteria and bacterial pathogens of plants: Overview; Survival and dissemination outside host; Epiphytic life; Chemotaxis; Ingress</td>
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<td>20</td>
<td>Bacteria: Quorum sensing; Secretion systems</td>
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<td>21</td>
<td>Bacteria: Pathogenicity factors and mechanisms; Avirulence</td>
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<tr>
<td>22</td>
<td>Fungi/Oomycetes overview; Fungal adhesion, germination, thigmotropism, appressoria, penetration of host cells/tissues</td>
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<tr>
<td>23</td>
<td>Fungal colonization: Biotrophic pathogens and endophytes; Haustoria; Cell wall degrading enzymes; Avirulence</td>
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<td>24</td>
<td>Fungal colonization: Necrotrophic pathogens; Toxins</td>
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<td>25</td>
<td>Nematodes: Physiology of nematode-plant interactions; Syncytia and giant cells</td>
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<td>Management of Disease: Breeding for disease resistance</td>
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<td>26</td>
<td>Management of Disease: Biological control</td>
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<tr>
<td>27</td>
<td>Management of Disease: Assessing relative risks of pathogens</td>
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- **Assignments, Exams and Grades:**
  - Note that undergraduate and graduate students will take different examinations to be commensurate with the differences in their academic backgrounds. Also, each graduate student, but not undergraduates, will be required to write a paper reviewing current literature on a topic to be assigned.
  - **Undergraduate Students**
    - Homework: 30 pts total
    - Midterm exam (take-home): 35 pts
    - Final exam: 35 pts
    - Grades
      - 90-100 pts: A
      - 80-89 pts: B
      - 70-79 pts: C
      - 60-69 pts: D
      - <60 pts: E
  - **Graduate Students**
    - Homework: 20 pts
    - Midterm paper: 25 pts
    - Midterm exam (take-home): 25 pts
    - Final exam: 30 pts
    - Grades
      - 90-100 pts: A
      - 80-89 pts: B
      - 70-79 pts: C
      - <70 pts: E