



UNIVERSITY OF KENTUCKY

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COLLEGE OF AGRICULTURE

April 7, 2008

MEMO

To: Dr. Jeannine Blackwell
Dean, Graduate School

From: Dr. Mike Mullen
Associate Dean

Re: Course Change for PPA 641

Please find attached a proposal for a title and description change on Plant Pathology 641. This was approved by the College in April, 2007. The proposal was overlooked at the start of the 2007-08 academic year and not forwarded in a timely fashion.

I appreciate any efforts to consider this proposal yet this spring.

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UNIVERSITY OF KENTUCKY
APPLICATION FOR CHANGE IN EXISTING COURSE: MAJOR & MINOR

1. Submitted by College of _____ Date _____
Department/Division offering course _____
2. Changes proposed:
(a) Present prefix & number _____ Proposed prefix & number _____
(b) Present Title _____
New Title _____
(c) If course title is changed and exceeds 24 characters (Including spaces), include a sensible title (not to exceed 24 characters) for use on transcripts:

(d) Present credits: _____ Proposed credits: _____
(e) Current lecture: laboratory ratio _____ Proposed: _____
(f) Effective Date of Change: (Semester & Year) _____
3. To be Cross-listed as: _____
Prefix and Number _____ Signature: Department Chair _____
4. Proposed change in Bulletin description:
(a) Present description (including prerequisite(s)):

(b) New description:

(c) Prerequisite(s) for course as changed: _____
5. What has prompted this proposal?

6. If there are to be significant changes in the content or teaching objectives of this course, indicate changes:


7. What other departments could be affected by the proposed change?

8. Is this course applicable to the requirements for at least one degree or certificate at the University of Kentucky? Yes No
9. Will changing this course change the degree requirements in one or more programs? Yes No
If yes, please attach an explanation of the change. (NOTE – If “yes,” program change form must also be submitted.)
10. Is this course currently included in the University Studies Program? Yes No
If yes, please attach correspondence indicating concurrence of the University Studies Committee.

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11. 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. Check here if 400G-500.
12. Is this a minor change? Yes No
 (NOTE: See the description on this form of what constitutes a minor change. Minor changes are sent directly from the Dean of the College to the Chair of the Senate Council. If the latter deems the change not to be minor, it will be sent to the appropriate Council for normal processing.)
13. Within the Department, who should be consulted for further information on the proposed course change?
 Name: _____ Phone Extension: _____

Signatures of Approval:

Date of Approval by Department Faculty	Dr. David A. Smith Reported by Department Chair
Date of Approval by College Faculty	 Reported by College Dean
*Date of Approval by Undergraduate Council	Reported by Undergraduate Council Chair
*Date of Approval by Graduate Council	Reported by Graduate Council Chair
*Date of Approval by Health Care Colleges Council (HCCC)	Reported by HCCC Chair
*Date of Approval by Senate Council	Reported by Senate Council Office
*Date of Approval by University Senate	Reported by Senate Council Office

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

The Minor Change route for courses is provided as a mechanism to make changes in existing courses and is limited to one or more of the following:

- a. change in number within the same hundred series;
- b. editorial change in description which does not imply change in content or emphasis;
- c. editorial change in title which does not imply change in content or emphasis;
- d. change in prerequisite which does not imply change in content or emphasis;
- e. cross-listing of courses under conditions set forth in item 3.0;
- f. correction of typographical errors. [University Senate Rules, Section III - 3.1]

PPA641

Plant Disease, Population Biology, and Biotechnology

- **Instructors:**
 - P. Vincelli PVINCELL@MAIL.UKY.EDU
 - M. Goodin MGOODIN@UKY.EDU

Meeting time: Wednesdays; 3:00 – 3:50 p.m.

Meeting place: Plant Science Building, 2nd floor conference room.

Goal: To understand implications of deployment of biotechnology and other disease management practices at the level of host and pathogen populations.

When the student finishes this course, s/he will be able to:

1. understand basic concepts of population genetics
2. discuss the application of biotechnology from a global perspective
3. discuss how deployment of transgenes influences pathogen populations.

Textbook: We will not use a textbook. Instead, assigned readings will be handed out. It is the responsibility of each student to read the assigned material.

Primary assigned reading: McDonald BA, Linde C. (2002) Pathogen population genetics, evolutionary potential, and durable resistance. *Annu. Rev. Phytopathol.* 40:349-79.

GRADING

Attendance and Participation 30%
Weekly short-answer questions/essays.....70%

Final Exam – NONE

Weekly assignments: Each week students will be assigned a list of questions (short answer) or a paper to review. Reviews (2 pages MINIMUM in length) will be written according to the format in the hand-out provided (see “manuscript review template”) in a font size not greater than Times 12 pt.

LECTURES

1. August 23

Goodin: Agricultural and ecological disequilibrium

- a. The “World Cup” – the real score!

b. Thinking about “equilibrium”

- LeChatelier’s Principle
- Newton’s Third Law of Motion
- Hardy-Weinberg Equilibrium

c. What agricultural practices were in place prior to deployment of transgenic plants?

- Large-scale irrigation projects
- Multi-million hectare monoculture
- Classical breeding – lessons from classical breeding apply to GMOs
- Agrochemicals – lessons from use of agrochemicals apply to GMOs
- Variance around mean food supply

2. August 30

Vincelli: Selection in Plant Pathosystems

- Understanding the importance of defining and attributing terms relating to host plant resistance.
- Understanding that the host is a major selective force in shaping population genetics of the pathogen

3. September 6

Goodin: Strategies for reducing boom and bust cycles

- Breeding strategies are dependent on crop genetics/crop biology/use.
- Deployment strategies are dependent on crop genetics/crop biology/use.
- Disease control strategies are dependent on crop genetics/crop biology/use.
- Classical and molecular breeding strategies (including Agro/gene gun)
- Strategies/Policies are not applicable generally: case-by-case analyses
- “It works” is only the first step – Population biology determines ultimate success.

4. September 13

Vincelli: Introduction to computer simulation

- Deterministic vs. stochastic models
- Contrast with forecasting systems
- Instructions for using RESISTAN simulation model

5. September 20

Vincelli: Management practices as forces for selection: Fungicide resistance

- Understanding how management tactics affect the buildup of a fungicide-resistant biotype
- Understanding, by analogy, how management influences the buildup of a virulent pathogen biotype

6. September 27

Vincelli: Epidemiological components of disease resistance

- Partitioning disease development (or host plant resistance) into discrete events in the disease cycle

7. October 4

Vincelli: Fitness and population dynamics

- Hypothesis-testing of fitness attributes via computer simulations

8. October 11

Goodin: Reproductive/Mating Systems in plant pathogens

Assigned reading: McDonald BA, Linde C. (2002) Pathogen population genetics, evolutionary potential, and durable resistance. *Annu. Rev. Phytopathol.* 40:349-79.

- How does reproductive strategy (sexual vs asexual) affect evolution of resistance?
- How does gene flow affect evolution of resistance?

9. October 18

Goodin: Case study – Transgenic corn

Assigned reading: Gould F. (1998) Sustainability of transgenic insecticidal cultivars [TICs]: integrating pest genetics and ecology. *Annu Rev Entomol.* 43:701-26.

- Use of TICs drives evolution of insects. What strategies can be employed to slow the development of resistance in insects?
 - Gene pyramiding
 - Gene dosage
 - Refuge strategy (utility depends on genetics of resistance to TICs)

10. October 25

Goodin: Wheat R gene evolution

Assigned reading: Yahiaoui N, Brunner S, Keller B. (2006) Rapid generation of new powdery mildew resistance genes after wheat domestication. *Plant J.* 47(1):85-98.

- Has domestication of crop plants led to evolution/selection of genes not found in wild populations?

11. November 1

Goodin: Potato domestication – effects of population structure of *Phytophthora infestans*

Assigned reading: Gisi U, Cohen Y. (1996) RESISTANCE TO PHENYLAMIDE FUNGICIDES: a case study with *phytophthora infestans* involving mating type and race structure. *Annu Rev Phytopathol.* 34:549-572.

- How does the deployment of transgenic resistance differ from the use of fungicides?

12. November 8

Goodin: Case study: Selecting “appropriate” genes for use in TICs

Assigned reading: Mehlo L, Gahakwa D, Nghia PT, Loc NT, Capell T, Gatehouse JA, Gatehouse AM, Christou P. (2005) An alternative strategy for sustainable pest resistance in genetically enhanced crops. *Proc Natl Acad Sci* 102:7812-7816.

13. November 15

Goodin: Regulating the deployment of transgenic plants

- Review of UK policy on the use and development of transgenic plants
- Review of Federal guidelines on the use and deployment of transgenic plants

14. November 22 – Thanksgiving - no class

15. November 29

Vincelli: Role of agroecosystem diversity in management strategies

- History of pandemics that resulted from widespread genetic uniformity
- Southern corn leaf blight
- Victoria blight of oat
- Manifestations of diversity in agroecosystems

16. December 6

Review