COURSE INFORMATION AND REQUIREMENTS
MOLECULAR PLANT-PATHOGEN/PEST INTERACTIONS BSPM 450/550
SPRING 2012
11:00-12:15 ON TUES/THURS; 172 Morgan

A. Objectives:

To study the molecular mechanisms by which plants and pathogens interact during the progress of pathogenesis or resistance. Examples of plant/insect interactions, and how they are similar or different will be integrated. Areas covered will be the physiology, biochemistry, molecular biology, and molecular genetics of these interactions. Current information and hypotheses using different host/pathogen or host/pathogen or pest interactions as examples will be presented. Lectures will be followed by student-led discussions of the experimental approaches used or proposed to advance the hypotheses and contribute to an overall understanding of interactions at the molecular level.

B. Recommended Prerequisites:

Introductory courses in Plant Pathology, Plant Physiology, Genetics and Biochemistry and/or Molecular Biology.

C. Learning Outcomes: By the end of this course, students should be able to:

- Formulate scientific questions about how plants and pathogens interact to result in disease or resistance
- Evaluate experimental approaches for how to distinguish cause from effect
- Interpret, evaluate, and discuss research papers on plant-microbe interactions
- Describe the current hypotheses on how plants and microbes interact

D. Participation in discussions of research papers:

A series of research papers will be assigned as required reading throughout the semester. Some of these papers will be designated for class discussion. The discussion will count toward your grade. **EACH OF YOU WILL LEAD ONE DISCUSSION DURING THE SEMESTER, AND ALL OF YOU WILL BE EXPECTED TO BE PREPARED TO DISCUSS EACH ASSIGNED PAPER ALL SEMESTER. A quiz may be given at the beginning of each discussion period to ensure that you have read the papers.**

E. Exams:

Two exams will be given (see schedule). The final will be comprehensive (yes, this means the whole semester will be covered!!!). Exams will be a combination of essay, short answer and multiple choice. The essay questions involve interpretation of data or experimental design.

F. Grading:

The course grade will be based on the two exams and the participation and preparation for the discussion sessions.

Exam I	30%
Final Exam	40%
Discussion/Quizzes	30%

E. Text:

No text is required. This is a rapidly moving field, so instead, lists of selected references, including review articles when available, will be provided throughout the semester. Various articles will be designated as required reading (*and yes, they will be covered on the exams*). Some good general references that are relevant to the course (but are somewhat old) are:

Biochemistry & Molecular Biology of Plants. 2000. Bob B. Buchanan, Wilhelm Gruissem, and Russell L. Jones. ASPB Press

Plants, Genes, and Crop Biotechnology. M.J. Chrispeels, and D.E. Sadava. 2003. Jones & Bartlett Publishers, Boston. pp. 562.

Molecular Plant Pathology. Dickinson,M. 2003. BIOS Scientific Publishers ISBN:, 1859960448

Plant pathogenesis and resistance: biochemistry and physiology of plant-microbe interactions. JS Huang - 2001 - Dordrecht; Boston: Kluwer Academic ISBN: 0792371186

Plant-Microbe Interactions, a special issue of **The Plant Cell**, October, 1996.

***RNAi: A guide to gene silencing*.** 2003. Edited By Gregory J. Hannon, *Cold Spring Harbor Laboratory*

The Biochemistry and Physiology of Plant Disease. R. N. Goodman, Z. Kiraly, and K. R. Wood. University of Missouri Press: 1986. Pp. 433. *(an oldie but goldie)*

The Hypersensitive Reaction in Plants to Pathogens. R.N. Goodman and A. J. Novacky. APS Press: 1994. Pp. 244.

Suggested guidelines for critiquing research papers for discussions:

1. What was the hypothesis presented in the paper? Was the hypothesis reasonable or testable?
2. What were the stated objectives of the paper? Were the objectives well defined? Did the objectives address the hypothesis?
3. What methods did the authors use in their research? Were the methods suitable considering their objectives? Are there alternative approaches that would be appropriate? How would you have approached the problem?
4. What were the results? Were they clearly presented and properly analyzed?
5. What conclusions did the authors draw? Were they justified? Did the authors make any assumptions (implicit or explicit) o draw these conclusions? Do you feel these assumptions are justifiable? What conclusions do you feel can be made from the data presented?
6. Did the authors meet their stated objectives? Did they definitively answer any other questions of interest or provide any other new and useful information? Do the conclusions support or refute the proposed hypothesis?
7. What further research should be done in this area, i.e., what is the next logical question?

SCHEDULE: SPRING 2012 REVISED March 2012

Molecular Plant-Microbe & Insect Interactions (BSPM 450/550)

CSU 11:00-12:15 pm Tues/Thurs

Morgan 172

DATE		LECTURE TOPIC
Jan	17	LECTURE 1: Introductions, overview of course. Plant-Pest Interactions: Definitions, concepts, research tools (LEACH)
	19	LECTURE 2: Pre-penetration, penetration and cell wall degradation (LEACH)
	24	LECTURE 3: Virulence Effectors and Pathogen Secretion of Effectors (LEACH)
	26	LECTURE 4: Pathogenicity factors: Toxins (LEACH)
	31	**PAPER DISCUSSION: Rashad**
Feb	2	LECTURE 5: Growth Regulators & Ti plasmid (LEACH)
	7	LECTURE 6: Viruses and gene silencing and disease (Verchot)
	9	LECTURE 7: Virus suppression of RNA silencing and its role in host compatibility (Verchot)
	14	**PAPER DISCUSSION: Donna**
	16	LECTURE 8: PAMPs and PAMP-triggered immunity (LEACH)
	21	LECTURE 9: Effector protein functions (LEACH)
	23	LECTURE 10: Effector Triggered Immunity and intro to R genes (LEACH)
	28	LECTURE 10b: Effector Triggered Immunity and intro to R genes (LEACH)
Mar	1	**PAPER DISCUSSION: Rene**
	6	MID-TERM EXAM
	8	LECTURE 11: NBS-LRR gene products, functional domains and divergent down stream signaling pathways (Verchot)
Mar	13	**PAPER DISCUSSION at OSU** ***SPRING BREAK at CSU***
	15	**PAPER DISCUSSION at OSU** ***SPRING BREAK at CSU***

	20	**PAPER DISCUSSION at CSU: Amy** ***SPRING BREAK at OSU***
	22	**PAPER DISCUSSION at CSU: Brad** ***SPRING BREAK at OSU***
	27	LECTURE 12: R genes and Sgt1/Rar1/ Hsp90 ubiquitin in disease resistance and susceptibility (Verchot)
	29	LECTURE 13: Cellular responses in disease resistance: Autophagy and endocytic pathway (Verchot)
Apr	3	LECTURE 14: Defense responses: Elicitors, HR, phytoalexins, PR Proteins (LEACH)
	5	LECTURE 15: Defense responses: Papillae, Lignin, ROS
	10	LECTURE 16: Systemic resistance (SAR & ISR) (LEACH)
	12	**PAPER DISCUSSION: Jackie (Chanda et al., 2011)**
	17	LECTURE 17: Oxidative stress and salicylic acid and plant viruses (Verchot)
	19	LECTURE 18: Virus intercellular transport (Verchot)
	24	**PAPER DISCUSSION: Laura (Humphrey et al, 2010)**
	26	LECTURE 19: Plant-Insect Interactions (Ode)
May	1	LECTURE 20: SUMMARY (LEACH)
	3	**PAPER DISCUSSION: Christy (Rasmann et al., 2012)**
	7/11	**FINAL EXAM week**