

## PLPA 8880

### PHYSIOLOGICAL AND MOLECULAR PLANT PATHOLOGY

#### 1) Instructor:

Dr. Leonardo De La Fuente  
Office: 225 Life Sciences Building  
Lab: 217 Life Sciences Building  
Phone: 844-2582  
[lzd0005@auburn.edu](mailto:lzd0005@auburn.edu)

**Office hours:** 1:00-2:00 PM Wednesdays

2) **Credit hours:** 3 credit hours.

**Prerequisites:** CHEM 6180, BIOL4230, or departmental approval.

#### 3) Texts:

Current review papers will be provided at the beginning of the semester.  
Plant Pathology. 2005. Agrios, G.N., Fifth edition.  
Plant Pathogenic Bacteria: Genomics and Molecular Biology. 2009. Jackson (Ed.)  
Comprehensive and molecular phytopathology. 2007. Dyakov, Y.T, Dzhavakhiya, and T. Korpela (eds.)

#### 4) Course Description:

Comprehensive coverage of molecular biology of plant-pathogen interactions.

#### 5) Course Objectives:

The course will present information regarding different aspects of plant pathology at the molecular level. The students will acquire an understanding of the molecular basis of the interactions between microbial plant pathogens and the host plant. The impact of molecular biology on the understanding and control of plant diseases will be emphasized. The discussion of recent publications dealing with basic aspects of research in plant pathology will make the students aware of cutting edge discoveries in this discipline.

#### 6) Course Content:

Date	Lecture
1-13	Introduction. Landmarks in molecular biology. Influence of molecular techniques in plant pathology.
1-15	Molecular diagnostic methods.
1-20	Taxonomy influenced by molecular techniques.
1-22	Genotyping. Full genome sequences of plant pathogenic microorganisms.
1-27	<b><u>Paper discussions</u></b> : Recent papers on taxonomy, genotyping, full genome sequences.
1-29	Mechanisms of pathogenicity in fungi.
2-3	Mechanisms of pathogenicity in bacteria.
2-5	Mechanisms of pathogenicity in nematodes and viruses.
2-10	<b><u>Paper discussions</u></b> : Recent papers on mechanisms of pathogenicity of plant pathogens.
2-12	Review Session
2-17	<b>EXAM I</b>
2-19	Interactions between bacterial pathogens and plant hosts.
2-24	Basal resistance of plants against pathogens.
2-26	Bacterial infection: type III secretion system, <i>hrp</i> genes, effectors.
3-3	Systemic acquired resistance and induced systemic resistance (SAR/ISR)
3-5	<b><u>Papers discussion</u></b> : Recent papers on bacteria-plant interactions.
3-10	Microbial ecology
3-12	Communication and regulation of pathogenicity among microorganisms.
3-15/3-20	<b>SPRING BREAK</b>
3-24	Modes of action of beneficial and biocontrol microorganisms.
3-26	<b><u>Paper discussions</u></b> : Recent papers on microbial communication, biocontrol.
3-31	Review session
4-2	<b>EXAM II</b>
4-7	Plant resistance to pathogens. Genetic modification of plants.
4-9	Gene silencing: principles and applications. Pathogen-derived resistance.
4-14	<b><u>Paper discussions</u></b> : Recent papers on plant resistance, gene silencing.
4-16	Biofilm formation: beneficial and deleterious.
4-21	Impact of diseases on nutrient availability in plants.
4-23	Molecular approaches to control diseases. <b>REVIEW PAPERS DUE</b>

4-28	<b><u>Paper presentations.</u></b> Present your assigned paper
4-30	<b><u>Paper presentations.</u></b> Present your assigned paper
5-7	<b>FINAL EXAM</b>

## 7) Course Requirements/Evaluation:

Examinations. The student will be evaluated during the semester in three examinations (Exam I, Exam II, and Final Exam). Each examination will count for 100pts towards the final grading.

Discussion sessions. During the semester there will be 5 discussion sessions when students will take turns presenting and discussing papers related to the topics studied in the past lectures. The student leading the discussion will be evaluated on the clarity and information of the presentation. All the students will be further evaluated by their participation during the discussions. Each session will count for 30 points, with a total of 150 points towards the final grading.

Review paper. Each student will pick a topic at the beginning of the semester and will write a short review paper. The paper should be 20 pages long, double-spaced, excluding references and figures. The format of the paper should follow the general guidelines for publication in the Annual Review of Phytopathology. An abstract of the review paper should be turned in by **March 24**, and the complete review paper is due on **April 23**. The paper will count for 100 points. During the last week of classes (**April 28-30**) each student will give a short presentation with the information included in his/her written review. The presentation should be about 20 min long and will have an additional 10 min for questions. The evaluation of the presentation will count for 50 points of the total grade. Some of the suggested topics for the review papers are the following, but students are encouraged to suggest different topics:

1. Citrus greening: study of the biology of unculturable bacteria
2. *Magnaporthe grisea*: a model phytopathogenic fungi
3. Post transcriptional gene silencing
4. *Xanthomonas campestris* effectors for virulence
5. Pyrosequencing: applications of fast and cheap DNA sequencing
6. Resistance and defense genes in (choose a crop)
7. *Phytophthora infestans* genotypes in the world
8. Genetically-modified plants: success, failure, and public opinion
9. Molecular control strategies for *Xylella fastidiosa*
10. Oomycetes infection process: *Pythium* sp.

Summary of grading:

<b>Task</b>	<b>Maximum points</b>
-------------	-----------------------

Exam I	100 points
Exam II	100 points
Final Exam	100 points
Discussion sessions (50 pt. each)	150 points
Review paper	100 points
Review paper presentation	50 points
<b>Total</b>	<b>600 points</b>

Grading system: from a total of 600 points, letter grades will be based on percentages:

A = 90 - 100%

B = 80 - 89%

C = 70 - 79%

D = 60 - 69%

F = 0 - 59%

### **8) Course Policy Statements:**

#### **Attendance:**

Attendance is required for all the classes. If the assigned examinations and/or date for the student presentation are missed, an excuse should be presented to the instructor 24 hours prior to the date if possible. We will schedule a make-up examination or presentation to be given outside the regularly scheduled class time. A make-up examination will only be given with a valid university excuse. This means a Doctor's statement (not an In-Out slip) or other documentation must be provided. The student is responsible for informing the instructor prior to missing the examination class.

### **9) Academic Honesty Policy:**

All portions of the Auburn University student academic honesty code (Title XII) found in the *Tiger Cub* will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

#### **Plagiarism and Academic Dishonesty:**

Plagiarism is the act of presenting directly or indirectly someone else's work as your own. Plagiarism is a major type of academic dishonesty and will not be tolerated. Similarly cheating on tests in any way, falsifying bibliographies, fraudulent quotes, and similar practices are intolerable forms of academic dishonesty. The University's policy for academic misconduct in the Student Code of Conduct will be followed for this course (*Tiger Club*, pp. 83 and 92). Please contact the instructor for any questions regarding its contents.

### **10) Learners with Disabilities:**

Auburn University is committed to providing accommodations and services to students with documented disabilities. Any learner with a qualified disability which requires accommodations should contact The Program for Students with Disabilities, 1244 Haley Center, Auburn

University, AL 36849, 334-844-2096 PH, 334-844-2099 FAX. More information is available on their website at [www.auburn.edu/disability](http://www.auburn.edu/disability). The office will fax or mail the required forms to learners to apply for services. Learners who have questions to participate in this course should contact the above office in advance to ensure proper accommodations.

**11) Justification for Graduate Credit:**

Students taking this course should have a solid knowledge of plant pathology and/or molecular biology. The material of the course will be in depth and will require the student to have solid basic knowledge in order to understand it. By leading discussions and writing a review paper the student will be motivated to participate and develop critical and analytical skills.