

UNIVERSITY OF PUERTO RICO
Mayagüez Campus
College of Agricultural Sciences
DEPARTMENT OF CROP PROTECTION

SYLLABUS and INSTRUCTOR INFORMATION SHEET FORM*

A. COURSE SYLLABUS

1. General Information:

COURSE NUMBER:	PROC 6015
COURSE TITLE:	SELECT TOPICS ON MOLECULAR ASPECTS OF PLANT PATHOLOGY
CREDITS:	Three credit hours.

2. COURSE DESCRIPTION:

The study of the biochemistry, physiology and molecular biology of plant pathogens interactions, stressing on the molecular mechanisms involved in disease development caused by organisms such as fungi, bacteria, nematodes and viruses.

3. PREREQUISITES

4. TEXT BOOK, SUPPLIES AND OTHER RESOURCES

TEXT: The course will rely on the discussion of the most recent scientific papers on the selected topic.

OTHER RESOURCES:

Agrios, G. 1997. Plant Pathology. 4th ed. Academic Press.

Agrawal A.A., S. Tuzun and E. Bent. 1999. Induced Plant Defenses Against Pathogens and Herbivores: Biochemistry, Ecology and Agriculture. APS. Press St. Paul. Minn. 403 pp.

Chet I. 1993. Biotechnology in Plant Disease Control. Wiley & Sons, Inc. Publication, N.Y.

Goodman R. and N. Keen. 1994. The Hypersensitive Response. APS, Press, St. Paul, Minn.

Goodman, R.N., Z. Kiraly and K.R. Wood. 1986. The Biochemistry and Physiology of Plant Disease. University of Missouri Press, Columbia.

Kohmoto K., U.S. Singh and R.P. Singh. 1995. Pathogenesis and Host Specificity in Plant Disease: Histological, Biochemical, Genetic and Molecular Bases. Vol. II. Eukaryotes. Pergamon/Elsevier Science Ltd. N.Y. 407 pp.

Mills, D., H. Kunoh, N. Keen and S. Mayama 1996. Molecular Aspects of Pathogenicity and Resistance: Requirement for Signal Transduction. 1996. APS Press. Minn. USA.

Petrini O. and G.B. Ouellette. 1994. Host Cell Wall Alterations. APS, Press, St. Paul, Minn.

Schots, A., F. M. Dewey and R.P. Oliver. 1994. Modern Assays for Plant Pathogenic Fungi. CABI International, Oxford, U.K.

Singh, R.P. and U.S. Singh. 1995. Molecular Methods in Plant Pathology. 1995. CRC Lewis Publishers, Boca Raton, London, Tokio

Singh, R.P., U.S. Singh and K. Kohmoto. 1995. Pathogenesis and Host Specificity in Plant Disease: Histological, Biochemical, Genetic and Molecular Bases. Vol. III. Viruses and Viroids. Pergamon/Elsevier Science Ltd. N.Y. 417 pp.

Singh, U. S., R.P. Singh and K. Kohmoto. 1995. Pathogenesis and Host Specificity in Plant Disease: Histological, Biochemical, Genetic and Molecular Bases. Vol. I. Prokaryotes. Pergamon / Elsevier Science Ltd. N.Y.

321 pp.

Stacey, G. and N. Keen . 1999. Plant Microbe Interactions Vol. 4. APS Press. ST. Paul. Minn. 296. pp

Stacey, G. B. Mullin and P.M. Gresshoff. 1997. Biology of Plant Microbe Interactions. APS Press. St. Paul. Minn. 608. Pp.

Wainwright, M. 1992. An Introduction to Fungal Biotechnology. Wiley and Sons Ltd., Chichester, England.

Weising, K.. and H. Nybom. 1995. DNA Fingerprinting in Plant and Fungi.

JOURNALS:

The Plant Cell: Plant Microbes Interactions 8(10):1996. Special Review Issue. CSHL press, N.Y.

Phytopathology - Published monthly by the American Phytopathological Society, APS Press, Minn.

Plant Disease - Published monthly by the American Phytopathological Society, APS Press, Minn.

Mycologia - Published monthly by the Mycological Society of America, The New York Botanical Garden, Bronx, New York

The Journal of Agriculture of the University of Puerto Rico. Published by the Agricultural Experiment Station of the University of Puerto Rico, Río Piedras, Puerto Rico.

5. PURPOSE

This course is preparatory work in completing a master in the Department of Crop Protection or related discipline of the College of Agricultural Sciences. However, students pursuing a master or Ph.D. degree from Departments such as Biology, Chemistry and Marine Sciences are encourage to register in this course.

6. COURSE GOALS

After completing the course the students should be able to accomplish the following objectives:

GENERAL OBJECTIVES:

1. Be expose to basic concepts on biochemistry, physiology and molecular biology of plant pathogens interactions.
2. Discuss the different biochemical physiological and molecular mechanisms involved in plant disease development.
3. Integrate concepts on the biochemistry, physiology and molecular biology of plant pathogens interactions.

SPECIFIC OBJECTIVES:

1. Discuss in details the plant infection processes as well as cellular mechanisms of infection resistance.
2. Explain the molecular genetics of plant disease emphasizing on the techniques currently used for genes manipulation in research.
3. Be familiarize with the most common and recent research methods used in molecular plant pathology.
4. Mention and explain the different cellular alterations at the biochemical and physiological level caused by plant pathogenic organisms.
5. Discuss current models used to explain recognition among pathogens and plants and signal transduction processes.
6. Mention and discuss in details molecular techniques currently used to diagnose plant diseases.

7. REQUIREMENTS:

All students are expected to: Complete all lessons, do all assigned readings and related work, come to class all the time and on time, pass all test to receive credit for the course.

8. LABORATORY AND FIELD WORK

The course does not required lab or field work.

9. DEPARTMENT/ CAMPUS POLICIES

9a. Class attendance: Class attendance is compulsory. The University of Puerto Rico, Mayagüez Campus, reserves the right to deal at any time with individuals cases of non-attendance. Professors are expected to record the absences of their students. Frequent absences affect final grade, and may even result in total loss of credits. Arranging to make up work missed because of legitimate class absence is the responsibility of the student. (Bulletin of Information Undergraduate Studies, pp. 39, 1995-96).

9b. Absence from examinations: students are required to attend all examinations. If a student is absent from an examination for a justifiable reason acceptable to the professor, he or she will be given a special examination. Otherwise, he or she will receive a grade of 0 or F in the examination missed. (Bulletin of Information Undergraduate Studies, pp. 39, 1995-96).

9c. Final Examinations: Final written examinations must be given in all course unless, in the judgment of the Dean, the nature of the subject makes it impracticable. Final examinations scheduled by arrangements must be given during examination period prescribe in the Academic Calendar, including Saturdays. (Bulletin of Information Undergraduate Studies, pp. 39, 1995-96).

9d. Partial withdrawals: A student may withdraw from individual courses at any time during the term, but before the deadline established in the university Academic Calendar. (Bulletin of Information Undergraduate Studies, pp. 37, 1995-96).

9e. Complete withdrawals: A student may completely withdraw from the University of Puerto Rico, Mayagüez Campus, at any time up to the last day of classes. (Bulletin of Information Undergraduate Studies, pp. 37, 1995-96).

9f. Disabilities: All the reasonable accommodations according to the American with Disability Act (ADA) Law will be considered with the Dean of Students and in accordance with the particular needs of the student.

9g. Ethics: Any academic fraud is subject to the disciplinary sanctions described in article 14 and 16 of the revised General Student Bylaws of the University of Puerto Rico contained in certification 018-1997-98 of the Board of Trustees. The professor will follow the norms established in articles 1-5 of the Bylaws.

10. CAMPUS RESOURCES

General Library and Agricultural Computer Center are available to obtain professor's references materials and PCs will be available for student use. University 's Student Center has tutorial programs for student who need extra help.

GENERAL TOPICS

Introduction :	Basic Concepts related to pathogens and pathogenicity
Infection Processes : cell penetration	Cytology, biochemistry, physiology and molecular biology of processes by pathogens.
Genetics of Plant Disease : genes from plant	Gene for Gene Hypothesis Current models used to explain the molecular interactions of and pathogen origin
Cellular Alterations :	Cell permeability, intracellular transport Subcellular organization Cell growth effects Cell wall and membrane alterations Infection Barriers Immobilization, compartmentalization
Physiological Alterations : (PRP).	Growth regulators Proteins: stress/heat shock, pathogenesis related proteins HRGP'S and protease inhibitors Hydrolitics and oxydatives enzymes Secondary metabolites Phytoalexins Secondary metabolism enzymes and their regulation Molecular genetics of secondary metabolites Toxins
Recognition :	Signal exchange and recognition Signal Perception Elicitor/receptor hypothesis Current models in cell recognition
Research Methods in Molecular Plant Pathology Molecular techniques currently used to diagnose plant pathogens	