Jordan University of Science and Technology
Faculty of Agriculture
Dept. of Plant Production
Course name: Clinical Plant Pathology (Plant Disease Diagnosis)
Course number: PP746

Semester offered: Spring 2006/2007
Next offering: Spring 2008/2009
Instructor: Dr. Firas Abu-El Samen (hiasat@just.edu.jo).

Office hours: Thursday 8-10 am or by arrangement with the instructor.

Time and place: Thursday 10-12 am, Dept. Seminar room, and 1-5 pm (Laboratory session) Plant Pathology research laboratory

General description and objectives:

PP746 is designed to be a practical course that emphasizes useful information for diagnosing and managing diseases of plants. Specific objectives of the course will be:

1. To provide students with a systematic approach to diagnosing plant problems in general, with a specific emphasis on plant pathogenic disease agents. Diseases and disorders of field crops, vegetable crops, fruits and nuts, ornamentals, and shade and forest trees will be covered.

2. To introduce students to modern diagnostic techniques used in the field and in the lab for both biotic disease agents and non-infectious disorders.

3. To instruct students in the basic principles of plant disease management and to provide an opportunity for students to apply learned principles to specific disease problems.

Prerequisites:
An introductory course in plant pathology such as PP441 and an introductory course in Entomology should provide sufficient background to the contents of this course.

Grading

1	Midterm Exam (both theoretical and practical)	25 pt
2	**Diagnostic Reports; Disease Management Reports, and Sample Collection** (equivalent to second exam)	30 pt
3	Class Activities	20 pt
4	Final Exam (both theoretical and practical).	25 pt
5	Total	100

Important dates and deadlines**

Midterm Exam	12/4/2007
Diagnostic Reports and Sample Collection Due date	15/5/2007
Final Exam	Finals week (May 26-June 4th)

Attendance:

Students are expected to attend class. If you are absent from a class, it is your responsibility to make up any work missed. Exams and other assignments missed due to unexcused absences will be counted as zero (0). There are no make up exams regardless of the reasons for missing an exam, students who miss the exam for any reason will have to prepare a term paper or a project assigned by the instructor.

Diagnostic Reports (25pt/100):

Each student enrolled in PP746 will be required to complete diagnosis reports for 50 disease specimens. Students may collect their own specimens or use those provided by class instructors. Discussing specimens with anyone is permissible. However, I do expect each student to complete on their own documentation necessary to complete each report on each specimen. Sharing disease specimens with classmates is not permitted, but the instructor realizes many times students will bring back or find similar diseases during the semester. A diagnostic report template will be provided to students on win-word format and most portions of the report have to be typed except for drawings or images taken from the field. Students need to have a laboratory book in which information about the diagnosis procedures are recorded, portion of the **Class Activities grade** will be credited to this **Field and Laboratory books.**

Disease Management Reports (5pt/100):

Each student will be required to prepare a disease management report for 2 important diseases that were diagnosed during the lab session or in a field trip, the disease management report is somewhat similar to an extension bulletin (2-3 pages long) , in which an integrated approach for management of a certain disease is presented. Each student is required to present at least one disease management report to the class as a mini-talk (10-15 min presentation on power point format).

Class Activities evaluation procedure (20pt/100):

During this class students will be asked to perform many assignments and activities, many of these assignments are individual and some are team work, I will keep a record of such activities and students' grades will be assigned based on their contribution to the class activities. Examples of such activities include, but not limited to:

- Bringing samples for the class to diagnosis.
- Processing samples for long-term storage.
- Preparation of growth media for the class.
- Organizing visits to farms and orchards for the purpose of collecting disease samples.
- Literature collection for identification of pathogenic organisms.
- Preparation of permanent microscopic slides, growing plants in the green house for pathogencity testing etc.,.
- Preparation of mini-talks and presentations about diseases of specific importance.
- Enriching the digital media library of this class with high quality images taken by you or downloaded from the internet.
- Attendance of all lectures, lab sessions and field trips (note: you will lose some points if you miss a class period, lab session or a field trip regardless of the legitimate reason for missing any activity.)

Text book

None is required, however many books and journal articles are going to be used. I have listed some useful references for students as reference materials (some are required readings). Class notes will be delivered as power point presentations and will be provided to students after each class as a PDF file attachment to an e-mail message from the instructor; please watch your e-mail for required and suggested readings.

Course Topics**

No	Topic	Contents	Required readings
1	Introduction to Plant Disease Diagnosis	The art and science of plant disease diagnosis; reasons for diagnosing plant diseases, concepts in diagnosing plant diseases, steps in diagnosing a plant disease	• **Shurtleff and Averre, 1997,** Chapter 1 (pages 1-5). • ***R. G. Grogan***, THE RELATION OF ART AND SCIENCE OF PLANT PATHOLOGY FOR DISEASE Control. Ann. Rev. Phytopathol. 1987. 25:1--8
2	The Plant Disease Clinic	Equipments and Supplies, field Clinics.	• **Shurtleff and Averre, 1997,** Chapter 2 (pages 7-36). • ***Ausher et al., 1996.*** THE ROLE OF PLANT CLINICS IN PLANT DISEASE DIAGNOSIS AND EDUCATION IN DEVELOPING COUNTRIES. *Annu. Rev. Phytopathol. 1996. 34:51–66* • ***Aycock, R.*** *The Plant Disease clinc- A thorn in the flesh or a challenging responsibility*. *Ann Rev. Phytopathol. 1*976.14:165-175
3	Gathering Information	Examining Field Problems, Recording field information, Collection, and preparation and shipping disease specimens.	• **Shurtleff and Averre, 1997.** Chapter 3 (pages 37-46).
4	Diagnosing in the Field	Symptoms and signs to look for when diagnosing a plant disorder, integration of information, hypothesis formulation and hypothesis testing.	• **Shurtleff and Averre, 1997.** Chapter 4 (47-97)
5	Diagnosing in the Clinic	Plant examination and pathogens isolation and identification techniques of different plant Pathogens. Conventional and Molecular methods used in Plant disease diagnosis.	• **Shurtleff and Averre, 1997.** Chapter 5 (97-118). • **Michailides, 2005.** Conventional and molecular assays aid diagnosis of crop diseases and fungicide resistance, California Agriculture Vol 59 (2): 115-123. • **Martin et al., 2002.** IMPACTS OFMOLECULAR DIAGNOSTIC TECHNOLOGIES ON PLANT DISEASE MANAGEMENT. Annu. Rev. Phytopathol. 2000. 38:207–39 • **M. L. Putnam, 1995.** Evaluation of selected methods of plant disease diagnosis. Crop Protection 14: 517-525.

6	Disease Diagnosis of Vegetable crops	Diagnosing diseases of tomato, cucurbits, pepper, eggplants, beans, lettuce, cauliflower, cabbage, potato, onion and garlic, etc.,	Field trip (Using compendiums and field guides)
7	Disease Diagnosis of Field crops	Diagnosing diseases of wheat, barley, chickpea, lentil etc.,	Field trip (Using compendiums and field guides)
8	Disease Diagnosis of Deciduous Fruit trees	Diagnosing diseases of pome fruits, stone fruits, grapes	Field trip (Using compendiums and field guides)
9	Disease Diagnosis of evergreen Fruit trees	Diagnosing diseases of Citrus and olives.	Field trip (Using compendiums and field guides)
10	Presentation of Disease Management reports by students	----------	----------

*****Arrangement of class topics is not fixed and subject to change depending on the laboratory work and field trips. A schedule of field trips will be provided to students two weeks ahead.**

Suggested references and readings Materials:

(Most of these books are available from the university library or can be borrowed from my office)

Books

1. **Agrios, G. N.** 2005. Plant Pathology, 5th ed. Elsevier Academic Press. 922pp.
2. **Wallwork, H (ed).** Cereal leaf and stem diseases. Published by Grains Research and Development Corporation, Australia, 102pp.
3. **Banks, E. (ed) 2005.** Potato Field guide (Insects, Diseases and Defects). Ministry of Agriculture and food, Ontario, Canada. 170pp.
4. **MacNab, A.A., Sherf, A. F., and Springer, J.K. 1983.** Identifying Diseases of Vegetables. The Pennsylvania State University. 62pp.
5. **ZillinskyF. J. 1983.** Common Diseases of Small Grain Cereals. CIMMYT Publication, Mexico, 141 pp.
6. **Barnett, H. L., and Hunter, B.B. 1998.** Illustrated genera of imperfect fungi. APS press, American Phytopathological Society, St Paul, MN. 218pp.
7. **Schaad, N.W., Jones, J.B., and Chun, W. 2001.** Laboratory Guide for Identification of Plant Pathogenic Bacteria. APS press, American Phytopathological Society, St Paul, MN. 218pp.
8. **Lelliott, R. A., and Stead, D.E. 1987.** Methods for Diagnosis of Bacterial Diseases of Plants. British Society for Plant Pathology, Blackwell Scientific Publications, Oxford, London, 216pp.
9. **Waller, J.**M., Lenne, J.M., and Waller, S. J. 2001. Plant Pathologist's Pocketbook. Cabi Publishing, 450pp.

10. **Mamluk, O.F., Abu-Gharbieh, W.I., Shaw, C.G., AL-Musa, A., and AL-Banna, L.S. 1984.** A Check list of plant Diseases in Jordan. University of Jordan Press, Amman, 107pp.

11. **Jones, A., and Sutton, T. B. 1996.** Diseases of Tree Friuts in the East. Michigan State University extension, NCR45, 95pp.

12. **Shurtleff, M. C., and Averre, A. W. 1997.** The Plant Diseases Clinic and Field Diagnosis of Abiotic Diseases. American Phytopathological Society, St Paul, MN.

13. **Fox, R. T. V.** 1993. Principles of Diagnostic techniques in Plant Pathology. CAB International. 213pp.

14. **Compendium of Diseases.** St. Paul, MN: APS Press. A series of publications covering diseases of many common crops, published by the American Phyotopathological Society's APS *Press.* (there is a compendium for almost all crop plants of economic importance)

15. **Sinclair, W.A., H.F. Lyon and W.T. Johnson.** 1987. Diseases of Trees and Shrubs. Cornell University Press. Ithaca, New York. 574 pp.

16. **Riffle, J.W. and G.W. Peterson.** 1986. Diseases of Trees in the Great Plains. Gen. Techn. Rept. RM-129. USDA Forest Service, Rocky Mountain Forest and Range Expt. Sta., Fort Collins. 149 pp.

17. **Blanchard, R. O., and Tattar, T. A.** 1981. Field and Laboratory guide to tree pathology. Academic Press Inc., 285pp.

18. **Blancard, H. Lecoq, and M. Pitrat. 1996.** A color Atlas of cucurbit diseases. Manson Publishing, 375 pp.

19. **Blancard, D., and Maisonneuve. 2006.** A color Atlas of lettuce and related salad crops. Manson Publishing, 375 pp.

20. **Ronald K. Jones, R. K., and Benson, D. M. 2001.** Diseases of Woody Ornamentals and Trees in Nurseries. APS Press, 482pp.

21. **Kelman et al.**, 1967. Source book of Laboratory exercises in Plant Pathology. APS. W.H. Freeman and Company, 387.

22. **Baudoin, A.** B. 1988. Laboratory exercises in Plant Pathology. APS press, 196 pp.

23. **Bennett, W.** F. (ed). 1993. Nutrient Deficiencies and toxicities in crop Plants. APS press, 202pp.

24. **Chase, A. R. 1997.** Foliage Plant Diseases, Diagnosis and Control. APS Press, St. Paul, Minnesota. 169 PP.

25. **Streets, R. B. 1971.** The diagnosis of plant diseases. (A field and laboratory manual emphasizing the most practical methods for rapid identification). University of Arizona Press,Tucson.

26. **Dhingra, O.D., and Sinclair, J.B.** Basic Plant Pathology Methods, 2nd ed. 1995. CRC Press Inc., 355pp.

Journal Articles

27. **Holmes, G. J., Brown, E. A., and Ruhl, G. 2000.** What's a picture worth? The use of modern telecommunications in diagnosing plant diseases. Plant Dis. 84:1256-1265.

28. **Hughes, G., McRoberts, N., and Burnett, C. 1999.** Decision-making and diagnosis in disease management. Plant Pathol. 48:147-153.

29. **Grogan, R. G. 1981.** The science and art of plant-disease diagnosis. Annu. Rev. Phytopathol. 19:333-351.

30. **Grogan, R. G. 1987.** The relation of the art and science of plant pathology for disease control. Annu. Rev. Phytopathol. 25:1-8.

31. **Miller, J., and Moran, J. 1997**. An evaluation of the disease diagnostic capabilities of Australian plant industries. Final Rep. Rural Industries Res. Devel. Corp. Project No. DAV 107A.

32. **Michailides, 2005.** Conventional and molecular assays aid diagnosis of crop diseases and fungicide resistance, California Agriculture Vol 59 (2): 115-123.

33. **Stewart, T. M. 2004.** Teaching the art and science of plant disease diagnosis: Training students with DIAGNOSIS for CROP PROBLEMS. The Plant Health Instructor. DOI:10.1094/PHI-T-2004-0426-01.

34. **Stewart, T. M., Blackshaw, B. P., Duncan, S., Dale, M. L., Zalucki, M. P., and Norton, G. A. 1995.** Diagnosis: a novel, multimedia, computer-based approach to training crop protection practitioners. Crop Prot. 14:241-246.

35. **Usher, R., Ben-Ze'ev, I. S., and Black, R. 1996.** The role of plant clinics in plant disease diagnosis and education in developing countries. Annu. Rev. Phytopathol. 34:51-66.

36. **Putnam, M. L. 1995.** Evaluation of selected methods of plant-disease diagnosis. Crop Prot. 14:517-525.

37. **Stewart T. M. 1992.** DIAGNOSIS, a microcomputer- based teaching aid. Plant Dis. 76:644-647.

38. **Martin et al., 2002.** IMPACTS OF MOLECULAR DIAGNOSTIC TECHNOLOGIES ON PLANT DISEASE MANAGEMENT. Annu. Rev. Phytopathol.38:207–39.

39. **Ausher et al., 1996.** THE ROLE OF PLANT CLINICS IN PLANT DISEASE DIAGNOSIS AND EDUCATION IN DEVELOPING COUNTRIES. Annu. Rev. Phytopathol. 1996. 34:51–66

40. **Aycock, R. 1976.** The Plant Disease clinc- A thorn in the flesh or a challenging responsibility. Ann Rev. Phytopathol.14: 165-175.