UNIVERSITY OF SARGODHA

Department of Plant Pathology, University College of Agriculture

COURSE OUTLINE FALL 2019

Course Title: Methods and Techniques in Plant Pathology

Course Code: PP-409

Credit Hours: 3(1-2)

Instructor: Dr. Muhammad Imran Hamid

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| **DESCRIPTION & OBJECTIVES** |

1. To acquaint students with different plant pathological research methods and techniques
2. Proper utilization of laboratory materials and equipments
3. Learning of advanced molecular biology methods
4. Practice of various software and online tools to study the plant pathogens
5. Project writing and report writing

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| **READINGS** |

1. Sibclair, J. B. 1995. Basic plant pathology methods. CRC press. USA
2. Bashir, M. and Hassan, S. 1998. Diagnostic methods for plant viruses, PARC.
3. Bhutta, A. R. and Ahmad, I. 2001. Seed pathological techniques and their application. National Book Foundation.
4. Narayanasamy, P. 2001. Plant pathogen detection and disease diagnosis. 2nd edition. Marcel dekker.
5. Trigiano, R. N., Windham, M. T. 2007. Plant pathology concepts and laboratory exercises. Second edition.
6. Burns, R. 2008. Plant pathology; techinques and protocols (methods in molecular biology). Humana press.

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| **CONTENTS** |

**Theory:**

1. Problem identification; hypothesizing; defining objectives for study
2. Collection, handling, transportation, processing, and preservation of different samples
3. Disease specimens handling and processing
4. Protocols and procedures used for the isolation; identification, purification, multiplication and preservation of plant pathogens
5. Demonstration of Koch's postulates
6. Multiple slide preparations; microscopy and morphological observation
7. Introduction to histo-pathological and molecular techniques
8. DNA extraction; purification; PCR analysis; gel electrophoresis
9. Sequencing; phylogenetic analysis; databases and species identification
10. Experimental layout; data collection; statistical analysis, interpretation and report writing

**Practical:**

1. Methods of collection and preservation of plant disease specimens
2. Soil sample collection and preservation; rhizosphere soil collection and preparations
3. General and screening media preparations
4. Isolation and identification of plant pathogens; preparation of temporary and permanent slides; microscopy and microphotography; micrometry of plant pathogens
5. Maintenance and preservation of cultures
6. Histo-pathological, serological, and molecular methods; DNA extraction and purification; PCR reaction and conditions; primer designing; gel electrophoresis and gel purification
7. Databases information and usage
8. Eperimental layout; data collection; statistical analysis and interpretation

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| **COURSE SCHEDULE** | | |
| **Week** | **Topics and Readings**: *Give Reading No from your list of readings above and its Page Nos. relevant to the topic(s) covered each week* | **Dates** |
| 1 | Problem identification; hypothesizing  defining objectives for study  Agrios, 2005; 34-39 | Sep, 5-8 |
| 2 | Collection, handling, transportation  Processing, and preservation of different samples  Agrios, 2005; 56-65 | Sep, 11-15 |
| 3 | Disease specimens handling  Processing of samples  Burns, 2008., 31-33 | Sep, 18-22 |
| 4 | Protocols and procedures used for the isolation; identification, Purification, multiplication and preservation of viruses  Burns, 2008., 34-40 | Sep, 25-29 |
| 5 | Protocols and procedures used for the isolation; identification, Purification, multiplication and preservation of fungi  Burns, 2008., 41-47 | Oct, 2-6 |
| 6 | Protocols and procedures used for the isolation; identification, Purification, multiplication and preservation of bacteria and nematodes  Burns, 2008., 48-56 | Oct, 9-13 |
| 7 | Demonstration of Koch's postulates  Multiple slide preparations; microscopy and morphological observation  Agrios., 2005; 277-290 | Oct, 16-20 |
| 8 | Revision and mid term examination | Oct, 23-27 |
| 9 | Introduction to histo-pathological techniques  Burns, 2008., 122-125 | Oct, 30-Nov, 3 |
| 10 | Introduction to molecular techniques  Burns, 2008., 210-218 | Nov, 6-10 |
| 11 | DNA extraction and purification  PCR analysis; gel electrophoresis  Burns, 2008., 219-224 | Nov, 13-17 |
| 12 | Sequencing and phylogenetic analysis  Databases and species identification  Burns, 2008., 225-230 | Nov, 20-24 |
| 13 | RNA extraction and purification  Reverse transcription and RT-PCR  Burns, 2008., 231-236 | Nov, 27-Dec, 1 |
| 14 | Protein extraction and gel electrophoresis techniques for proteins  Protein sequencing and analysis  Burns, 2008., 237-241 | Dec, 4-8 |
| 15 | Experimental layout; data collection  Statistical analysis, interpretation and report writing  Trigiano, 2007; 188-201 | Dec. 11-15 |
| 16 | Final Examination | Dec, 18-22 |

***Note****: You can reserve one week for sessional or mid-term exam, and if you wish, one week for student presentations of the assigned research project*

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| **RESEARCH PROJECT** |

1. Preparation of a research idea and write a research proposal
2. Collection of different protocols for DNA and RNA extraction from different samples

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| **ASSIGNMENT CRITERIA** |

*Write here the distribution of marks. You can chose any or all from the below for the purpose*

Sessional: 4

Project: 4

Presentation:

Participation:

Final Exam:

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| **RULES AND REGULATIONS** |

75% attendance is mandatory to appear in the final examination