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 samplesAgrios, 2005; 56-65 | Sep, 11-15 |
| 3 | Disease specimens handlingProcessing of samplesBurns, 2008., 31-33 | Sep, 18-22 |
| 4 | Protocols and procedures used for the isolation; identification, Purification, multiplication and preservation of virusesBurns, 2008., 34-40 | Sep, 25-29 |
| 5 | Protocols and procedures used for the isolation; identification, Purification, multiplication and preservation of fungiBurns, 2008., 41-47 | Oct, 2-6 |
| 6 | Protocols and procedures used for the isolation; identification, Purification, multiplication and preservation of bacteria and nematodesBurns, 2008., 48-56 | Oct, 9-13 |
| 7 | Demonstration of Koch's postulatesMultiple slide preparations; microscopy and morphological observationAgrios., 2005; 277-290 |  Oct, 16-20 |
| 8 | Revision and mid term examination |  Oct, 23-27 |
| 9 | Introduction to histo-pathological techniquesBurns, 2008., 122-125 | Oct, 30-Nov, 3 |
| 10 | Introduction to molecular techniquesBurns, 2008., 210-218 | Nov, 6-10 |
| 11 | DNA extraction and purificationPCR analysis; gel electrophoresisBurns, 2008., 219-224 | Nov, 13-17 |
| 12 | Sequencing and phylogenetic analysisDatabases and species identificationBurns, 2008., 225-230 | Nov, 20-24 |
| 13 | RNA extraction and purificationReverse transcription and RT-PCRBurns, 2008., 231-236 | Nov, 27-Dec, 1 |
| 14 | Protein extraction and gel electrophoresis techniques for proteinsProtein sequencing and analysisBurns, 2008., 237-241 | Dec, 4-8 |
| 15 | Experimental layout; data collectionStatistical analysis, interpretation and report writingTrigiano, 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