

**Department of Plant Pathology  
Faculty of Agricultural Sciences  
University of the Punjab, Lahore  
Course Outline**



<b>Programme</b>	B.Sc. (Hons.) Agriculture (Plant Pathology) 4 Year program	<b>Course Code</b>	<b>PP-310</b>	<b>Credit Hours</b>	3(2-1)
<b>Course Title</b>	<b>SEED AND POST-HARVEST PATHOLOGY</b>				
<b>Course Introduction</b>					
The course "SEED AND POST-HARVEST PATHOLOGY" is to make students familiar with the diagnosis, identification of casual agents, and management practices of the seed borne and post-harvest diseases.					
<b>Learning Outcomes</b>					
On the completion of the course, the students will:					
<ol style="list-style-type: none"> <li>To study basic and applied aspects of economically important diseases of seeds and post-harvest diseases and their management.</li> </ol>					
<b>Course Content</b>			<b>Assignments/Readings</b>		
<b>Week 1</b>	<b><u>THEORY</u></b> <b>Unit-I:</b> 1.1 Introduction to seed pathology		<b><u>Reading</u></b> 1. Agarwal, V.K. and <a href="#">J.B. Sinclair</a> , 1996. Principles of Seed Pathology, Second Edition. CRC Press. 560 pp. 2. Mahendra Nath Khare and Mohan S. Bhale.,2013.Seed Pathology in Modern Agriculture. 3. Lecture handouts		
	<b><u>PRACTICAL</u></b> Introduction to standard techniques and instruments used in Plat Pathology laboratories				
<b>Week 2</b>	<b><u>THEORY</u></b> <b>Unit-II:</b> 3.1. Importance and significant losses due to seed and postharvest diseases		<b><u>Reading</u></b> 1. Bhutta, A.R. 2010. Text Book of Introductory Seed Pathology. HEC, Pakistan.		
	<b><u>PRACTICAL</u></b> Different techniques for isolation and identification of microorganisms associated with seeds and their				

	effect on germination	
Week 3	<p><b><u>THEORY</u></b>  <b>Unit-III:</b>  3.1. Morphology and anatomy of healthy and infected seed Histopathology of infected seed and transmission of seed-borne pathogens</p>	<p><b><u>Reading</u></b>  1. Barkai-Golan, R. 2001. Post-harvest Diseases of Fruits and Vegetables: Development and Control. Elsevier. 418 pp.  2. Bartz, J.A. and J.K. Brecht. 2002. Post-harvest Physiology and Pathology of Vegetables. Marcel Dekker. India</p>
	<p><b><u>PRACTICAL</u></b>  Different techniques for isolation and identification of microorganisms associated with seeds and their effect on germination</p>	
Week 4	<p><b>Unit-IV:</b>  4.1. Seed-borne diseases and their effect on seed germination and planting value  4.2. Histopathology of infected seed and transmission of seed-borne pathogens</p> <p><b><u>PRACTICAL</u></b>  Different techniques for isolation and identification of microorganisms associated with seeds and their effect on germination</p>	<p><b><u>Reading</u></b>  a. Agarwal, V.K. 2006. Seed Health. International Book Distributing Company. 554 pp.</p>
Week 5	<p><b><u>THEORY</u></b>  <b>Unit-V:</b>  5.1. Effect of biotic and abiotic diseases during storage</p>	<p><b><u>Reading</u></b>  1. Bhutta, A.R., A. Hussain and M.R. Rahman. 2004. Hand book on Seed Processing and Storage. Federal Seed Certification and Registration Department, Islamabad, Pakistan.  2. Lecture handouts</p>
	<p><b><u>PRACTICAL</u></b>  Collection and identification of biotic and abiotic diseased specimens/samples of perishables</p>	
Week 6	<p><b><u>THEORY</u></b>  Quiz test  <b>Unit-VI:</b></p>	<p><b><u>Reading</u></b>  1. Bhutta, A.R. and I.</p>

	6.1. Transit and on shelf life of seeds and perishables	Ahmad. 2001. Seed Pathological Techniques and their Application. National Book Foundation, Islamabad, Pakistan 2. Lecture handouts
	<b><u>PRACTICAL</u></b> Different techniques for isolation and identification of microorganisms associated with seeds and their effect on germination	<b><u>Assignment (Practical)</u></b> Diseased sample collection and preservation.
Week 7	<b><u>THEORY</u></b> <b>Unit-VII:</b> 7.1 Epidemiology of seed-borne diseases	<b><u>Assignment (Theory):</u></b> Topics will be assigned to individual or group of students. <b><u>Reading</u></b> 1. Internet and Research Articles. 2. Lecture handouts.
	<b><u>PRACTICAL</u></b> Postharvest losses estimation/ assessment	
Week 8	<b><u>THEORY</u></b> <b>Unit-VIII:</b> 8.1. Seed health testing	<b><u>Reading</u></b> 1. Lecture handouts
	<b><u>PRACTICAL</u></b> Seed health testing	
Week 9	<b>MID-TERM</b>	
Week 10	<b><u>THEORY</u></b> <b>Unit-IX:</b> 9.1. Mycotoxins and their hazards	<b><u>Reading</u></b> 1. Dennis, S.H. 2002. Pests of stored Foodstuffs and their Control. Kluwer Academic publishers. India. <b><u>Assignment (Theory):</u></b> Topics will be assigned to individual or groups.
	<b><u>PRACTICAL</u></b> Visits to grains, fruits and vegetables store houses	
Week 11	<b><u>THEORY</u></b> <b>Unit-X:</b> 10.1 Economic importance of post harvest losses in seeds, fruits and vegetables during processing	<b><u>Reading</u></b> 1. Gullino, M.L. and D. Prusky. 2009. Post-Harvest Pathology (Plant Pathology in the

	<b><u>PRACTICAL</u></b> Visits to grains, fruits and vegetables store houses	21st Century). Springer.
<b>Week 12</b>	<b>Unit-XI:</b> 11.1. Factors affecting postharvest losses (physical, physiological, biochemical and pathological)  <b><u>PRACTICAL</u></b> Use of safe chemicals/fumigants for management of seed and post harvest diseases.	
<b>Week 13</b>	<b><u>THEORY</u></b> <b>Group Discussion</b>  <b>Unit XII:</b> 12.1. Management of seed and postharvest diseases  <b><u>PRACTICAL</u></b> Use of safe chemicals/fumigants for management of seed and post-harvest diseases.	<b><u>Reading</u></b> 1. Narayanasamy, P. 2006. Post-harvest Pathogens and Disease Management. John Wiley & Sons, Inc., Hoboken, New Jersey. 578 pp. 2. Lecture handouts
<b>Week 14</b>	<b>REVISION/TEST</b>	<b><u>Project (Practical)</u></b> Isolation and purification of pathogens.
<b>Week 15</b>	<b><u>THEORY</u></b> <b>Unit XIII:</b> 13.1. Methods and structure of storage at farm and public level.  <b><u>PRACTICAL</u></b> Storage house visit	<b><u>Reading</u></b> 1. Snowdon, A.L. 2010. A color Atlas of Post-Harvest Diseases and Disorders of Fruits and Vegetables: Volume 1: General Introduction & Fruits. Wolfe Scientific Ltd. 302 pp.
<b>FINAL-TERM</b>		
<b>Textbooks and Reading Material</b>		
<b>Suggested Readings</b>		
<b>BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Agarwal, V.K. 2006. Seed Health. International Book Distributing Company. 554 pp.</li> <li>2. Agarwal, V.K. and J.B. Sinclair. 1996. Principles of Seed Pathology, Second Edition. CRC Press. 560 pp.</li> <li>3. Barkai-Golan, R. 2001. Post-harvest Diseases of Fruits and Vegetables: Development and Control. Elsevier. 418 pp.</li> <li>4. Bartz, J.A. and J.K. Brecht. 2002. Post-harvest Physiology and Pathology of</li> </ol>		

Vegetables. Marcel Dekker. India

5. Bhutta, A.R. and I. Ahmad. 2001. Seed Pathological Techniques and their Application. National Book Foundation, Islamabad, Pakistan
6. Bhutta, A.R., A. Hussain and M.R. Rahman. 2004. Hand book on Seed Processing and Storage. Federal Seed Certification and Registration Department, Islamabad, Pakistan.
7. Bhutta, A.R. 2010. Text Book of Introductory Seed Pathology. HEC, Pakistan.
8. Dasgupta, M.K. and N.C. Mandal. 1989. Postharvest Pathology of Perishables. Oxford & IBH Publishing Company Private, Limited. 638 pp.
9. Dennis, S.H. 2002. Pests of stored Foodstuffs and their Control. Kluwer Academic publishers. India
10. Gullino, M.L. and D. Prusky. 2009. Post-Harvest Pathology (Plant Pathology in the 21st Century). Springer.
11. Narayanasamy, P. 2006. Post-harvest Pathogens and Disease Management. John Wiley & Sons, Inc., Hoboken, New Jersey. 578 pp.
12. Neergaard, P. 1977 & 1988. Seed Pathology: Volume 1&2. John Wiley & Sons, Incorporated. pp.1187.
13. Prusky, D. and M. Lodovica Gullino. 2010. Post-harvest Pathology Springer. pp.211.
14. Schumann, G.L. and C.J. D'Arcy. 2010. Essential Plant Pathology. APS Press. 369 pp.
15. Snowdon, A.L. 2010. A color Atlas of Post-Harvest Diseases and Disorders of Fruits and Vegetables: Volume 1: General Introduction & Fruits. Wolfe Scientific Ltd. 302 pp.
16. Gullino, M.L. and Munkvold, G. eds., 2014. Global Perspectives on the Health of Seeds and Plant Propagation Material (Vol. 6). Springer.
17. Mahendra Nath Khare and Mohan S. Bhale.,2013.Seed Pathology in Modern Agriculture.

**Journal Articles/ Reports**

Resources will be shared during class

**Teaching Learning Strategies**

1. Class lectures
2. Discussions
3. Practical demonstrations
4. Hands on training where applicable

**Assignments: Types and Number with Calendar**

**Assignments**

Types and Number with calendar

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.

2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.