Curriculum Planner 2025-26 (odd semester)
Dr. Monika Keisham
(Department of Botany, Kalindi College)

Course: B. Sc. Botany (H) 3rd Year
Semester: V
Paper: Plant Pathology (DSE)

<table>
<tr><td colspan="3">THEORY</td></tr>
<tr><td>Topic</td><td>Essential and Suggested Readings</td><td>Approximate schedule (2025)</td></tr>
<tr><td>Unit 1: Introduction 04 Hours

Definition of disease and its components (disease pyramid); Classification of diseases (on the basis of pathogens; geographical distribution; extent of occurrence); History and significance of Phytopathology (with special reference to India); Eminent plant pathologists and their contributions (Anton de Bary; E.J. Butler; Louis Pasteur; PMA Millardet; E.F. Smith; Adolf Mayer; K.C. Mehta, J.F. Dastur ; B.B. Mundkur; R.N. Tandon).

Unit 2: Basic concepts of Plant Pathology 04 Hours

Definitions (Pathogenesis; Pathogen; symptoms; etiology); Types of pathogens and their Symptoms (Fungus, Oomycetes, Bacteria, Virus, Nematode, Phytoplasma); Koch's Postulates; Disease cycle (Components) - Epidemiology and forecasting of Plant diseases.</td><td rowspan="2">1. Singh, R.S. (2021). Plant Diseases 10th revised edition, Medtech, New Delhi.
2. Schumann, G.L. and D’Arcy C.J. (2009). Essential Plant Pathology 2ndedition, AmericanPhytopathological Society, U.S.A.
3. Agrios, G.N. (2005). Plant Pathology 5th edition, Elsevier Academic Press, Amsterdam.
4. Gupta, R. and Chugh, G. (2022). Plant, Microbes and Diseases. I.K. International Pvt. Ltd., Delhi.
5. Oliver, R. (2023). Agrios’ Plant Pathology 6th edition, Academic Press.
Suggestive readings:
1. Sharma, P.D. (2014). Plant Pathology Rastogi Publications, Meerut, U.P.
2. Ownley B.H. and Trigiano R.N. (2016. Plant Pathology Concepts and Laboratory Exercises 3rd edition, CRC Press.
3. Singh, R.S. (2017). Introduction to Principles of Plant Pathology, 5th edition, Medtech, New Delhi.</td><td>August</td></tr>
<tr><td>Unit 3: Host- -Pathogen relationship 04 Hours
How pathogens attack plants (brief concept on mode of penetration; post-penetration and colonization). Plant defence mechanisms (Constitutive and induced, structural and biochemical).

Unit 4: Fungal diseases 05 Hours
Causal Organism, Symptoms, Disease</td><td>September</td></tr>
</table>

Cycle and control: Powdery mildew of Pea; Ergot of Rye; Apple scab, Early blight of potato, red rot of sugarcane, Black, Yellow and Brown rust of Wheat; Smut of Barley (Loose and Covered Smut).	4. Tronsmo A.M., Munk L., Anika D., Tronsmo A., Yuen J and Collinge D.B. (2020). Plant Pathology and Plant Diseases. CABI Publishing, U.S.A.	
Unit 5: Oomycete Diseases 03 Hours Causal organism, symptoms, disease cycle and control: Late Blight of Potato; White Rust of Crucifers; Downy mildew of Grapes. **Unit 6: Bacterial Diseases 01 Hours** General symptoms; Disease cycle and Control measures - Citrus canker; Angular leaf spot of Cotton. **Unit 7: Viral Diseases 01 Hours** General symptoms; Mode of transmission and Control measures-Tobacco mosaic disease; Vein Clearing of Bhindi **Unit 8: Nematode Diseases 01 Hours** General symptoms, Disease cycle and Control measures-Root knot disease of Brinjal. **Assignment topics given and assessment of submitted assignments**		October
Unit 9: Plant Disease Control 07 Hours Plant quarantine and its significance; Methods of disease control: Physical (Heat treatment, drying, radiation and regeneration); Chemical methods (foliar spray; dust, seed treatment; soil treatment; treatment of wounds). Types of fungicides - Inorganic (Bordeaux mixture, Fixed copper; Sulphur, Lime Sulphur); Organic (Dithiocarbamates, quinones); Systemic fungicides and their mode of action (Oxanthin, Strobilurins, Benzimidazole, Pyrimidine). Cultural practices (Host eradication, sanitation, crop rotation, Polythene traps, Mulches) Biological Control (Antibiosis, hyper - parasitism, Hypovirulence, Predation, Induced systemic Resistance).		November

Conduction of tests for internal assessment		

Course: B. Sc. Life Sc. (P) 3rd Year
Semester: V
Paper: Plant Physiology and Metabolism (DSC)

PRACTICAL		
Topic	**Essential and Suggested Readings**	**Approximate schedule (2025)**
1. Determination of osmotic potential of plant cell sap by plasmolytic method. 2. To study the effect of the environmental factor light on transpiration by excised twig. 3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte. 4. To demonstrate Respiratory Quotient (RQ)	Bajracharya, D. (1999) Experiments in Plant Physiology. A Laboratory Manual. Narosa Publishing House, New Delhi	August
5. To study the activity of catalase and study the effect of pH on the activity of enzyme. 6. To Study Hill's reaction. 7. To study the effect of light intensity on O_2 evolution in photosynthesis.		September
8. Comparison of the rate of respiration in any two parts of a plant. 9. To separate photosynthetic pigments by paper chromatography. 10. Bolting / Effect of auxins on rooting.		October
11. To demonstrate the delay of senescence by cytokinins/ effect of ethylene on fruit ripening.		November

12. To study the phenomenon of seed germination (effect of light and darkness). **Conduction of practical mock exam**		

Course: B. Sc. Botany (H) 3rd Year
Semester: V
Paper: Plant Physiology (DSC)

PRACTICAL		
Topic	**Essential and Suggested Readings**	**Approximate schedule (2025)**
1. Determination of osmotic potential of plant cell sap by plasmolytic method. 2. Determination of water potential of potato tuber cells by weight method. 3. Determination of water potential of potato tuber cells by falling drop method.	Bajracharya, D. (1999) Experiments in Plant Physiology. A Laboratory Manual. Narosa Publishing House, New Delhi	August
4. Study of effect of light on the rate of transpiration in excised leafy twig. 5. Calculation of stomatal index and stomatal frequency from the lower surface of leaves of a mesophyte and a xerophyte. 6. To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and a xerophyte (lower surface).		September
7. To study the effect of different concentrations of ABA on stomatal closure. 8. To study the effect of light and dark on seed germination. 9. To study induction of amylase activity in germinating barley grains.		October
10. To study the effect of ethylene on fruit ripening. 11. To study the effect of auxin on rooting. **Conduction of practical mock exam**		November

Course: B. Sc. Botany (H) 1st Year
Semester: I
Paper: Basic Laboratory and Field Skills in Plant Biology (DSC)

<table>
<tr><td colspan="3">PRACTICAL</td></tr>
<tr><td>Topic</td><td>Essential and Suggested Readings</td><td>Approximate schedule (2025)</td></tr>
<tr><td>1. Preparation of solutions- molar, molal, normal, percentage, stock,
standard and serial dilution

2. Determining pH of solutions (pH paper, Universal indicator, pH meter)
and preparation of buffers (Phosphate, Tris-Cl, Electrophoresis buffers -
TBE/TAE)

3. Working of instruments -light microscope, autoclave, laminar air flow, spectrophotometer, centrifuge, gel electrophoresis unit (Agarose & Poly acrylamide).</td><td rowspan="4">1. Evert, R. F., Eichhorn, S. E., Perry, J.B. (2012). Laboratory Topics in Botany. W.H. Freeman and Company.
2. Mesh, M.S., Kebede-Westhead, E. (2012). Essential Laboratory Skills for Biosciences. John Wiley & Sons, Ltd.
3. Mu, P., Plummer, D. T. (2001). Introduction to practical biochemistry. Tata McGraw-Hill Education.
4. Mann, S. P. (2016). Introductory Statistics, 9th edition. Hoboken, NJ, John Wiley and Sons Inc.
4. Danniel, W.W. (1987). Biostatistics. New York, NY: John Wiley Sons.
5. Jones, A.M., Reed, R., Weyers, J. (2016). Practical Skills in Biology, 6th Edition, Pearson
6. Bisen, P.S. (2014). Laboratory Protocols in Applied Life Sciences, 1st edition. CRC Press. Suggested readings:
7. Zar, Z. H. (2010). Biostatistical Analysis, 5th edition, Pearson Prentice Hall, New Jersey, USA.</td><td>August</td></tr>
<tr><td>4. Temporary peel mount slide preparation and staining (safranin and acetocarmine).

5. Calculate cell size using micrometer.

6. Calculate number of cells (pollen/spores) using haemocytometer.</td><td>September</td></tr>
<tr><td>7. Preparation of LB medium, growth and maintenance of bacterial cultures
(liquid –serial dilution method; and semi-solid cultures - streak, spread and pour plates)

8. Isolation of genomic DNA from E. coli and plant leaf material, Agarose
gel electrophoresis
9. Calculation of mean, mode, median, standard deviation using data set (collected from experiments 5 and 6).</td><td>October</td></tr>
<tr><td>10. Using software to draw tables, graphs and calculating descriptive statistics (Microsoft Excel)

11. Laboratory safety equipment (Fire extinguisher, Fume hood, safety glasses)</td><td>November</td></tr>
</table>

12. Mounting of a properly dried and processed plant specimen with herbarium label. **Conduction of practical mock exam**		

Course: B. Sc. Botany 3rd Year
Semester: V
Paper: Mushroom Culture and Technology I (SEC)

PRACTICAL		
Topic	**Essential and Suggested Readings**	**Approximate schedule (2025)**
1. To study the principle and operation of Autoclave, Incubator, Laminar Air Flow/ BSL 2 facility. 2. To study poisonous mushrooms (*Amanita, Cortinarius, Psilocybe, Coprinopsis*). 3. Preparation of various types of compost and media which can be used for cultivation of mushroom. 4. To study the cultivation technique of *Agaricus* mushroom. 5. To study the cultivation technique of *Calocybe/ Volvariella* mushroom. 6. To study the nutritional value and market value of mushrooms, and post-harvest technologies like packaging and preservation. 7. Entrepreneurship in cultivation of mushrooms. 8. Visit to an Institute or Center conducting mushroom cultivation (Report to be submitted). **Continuous assessment throughout the whole semester with tests, assignments etc.**	1. Bahl, N. (2015). Hand Book on Mushroom. Page no. 1-166. Oxford &IBH Publishing Company. 2. Russell, S. (2014). The Essential Guide To Cultivating Mushroom. Storey Publishing. North Adams, M.A. 01247. 3. Zied, D. C., Gimenez, A. P. (017) Edible and Medicinal Mushroom page no. 1- 585.John Wiley & Sons Ltd.UK. 4. Chang, S.T., Miles, P.G. (2004) Mushrooms Cultivation, Nutritional Value, Medicinal effect and Environmental Impact, CRC Press. 5. Fletcher, J.T., Gaze, R.H. (2007). Mushroom Pest and Disease Control. CRC Press. 6. Ahlawat, O.P., Tewari , R.P. (2007) .Cultivation Technology Of Paddy Straw Mushroom (Volvariella volvacea). Pages 1-44 National Research Center for Mushroom (Indian Council of Agricultural Research) Chambaghat, Solan (HP). 7. Rai, R.D., Arumuganathan, Y. (2008). Post Harvest Technology of Mushrooms. National Research Center for Mushroom (Indian	August-November

	Council of Agricultural Research) Chambaghat, Solan (HP) 8. Singh, M., Vijay, B., Kamal, S., Wakchaure, G.C. (2011) . Mushrooms Cultivation, Marketing and Consumption., Publishers Directorate of Mushroom Research (ICAR) Chambaghat, Solan.	