

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN PLANT BIOLOGY**  
**AND PLANT BIOTECHNOLOGY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

<b>Title of the Course</b>		<b>PLANT DIVERSITY – II: FUNGI, BACTERIA, VIRUSES, PLANT PATHOLOGY AND LICHENS</b>					
<b>Paper Number</b>		CORE III					
<b>Category</b>	Core III	<b>Year</b>	I	<b>Credits</b>	5	<b>Course Code</b>	139C2A
		<b>Semester</b>	II				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>		<b>Lab Practice</b>	<b>Total</b>	
		4	1		--	5	
<b>Pre-requisite</b>		Students should be familiar with the basics of fungi, bacteria, viruses and lichens.					
<b>Learning Objectives</b>							
<b>C1</b>		To describe the common characteristics of fungi as being heterotrophic, unicellular/multicellular.					
<b>C2</b>		To understand the biology of fungi and to discuss the importance of fungi in various ecological roles					
<b>C3</b>		To understand lichen structure, function, identification, and ecology; Comprehend the events of symbiosis and lichenization and to demonstrate the use of lichens as bioindicator species.					
<b>C4</b>		To identify the main groups of plant pathogens, their symptoms.					
<b>C5</b>		To understand the various types of plant diseases.					
<b>Course outcomes:</b>						Programme outcomes	
<b>On completion of this course, the students will be able to:</b>							
<b>CO</b>							
1. Recognize the general characteristics of microbes, fungi and lichens and disease symptoms.						K1	
2. Develop an understanding of microbes, fungi and lichens and appreciate their adaptive strategies based on structural organization.						K2	
3. Identify the common plant diseases, according to geographical locations and device control measures.						K3	
4. Analyze the emerging trends in fungal biotechnology with special reference to agricultural and pharmaceutical applications.						K4	
5. Determine the economic importance of microbes, fungi and lichens.						K5	

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UNIT	EXPERIMENTS
<b>I</b>	<b>FUNGI</b> Classification of fungi - (Alexopoulos and Mims, 1979), criteria for classification, Characteristic features, thallus organization, mode of nutrition, structure, reproduction and life-history of classes. Zygomycotina ( <i>Mucor</i> ), Ascomycotina ( <i>Peziza</i> ), Basidiomycotina ( <i>Puccinia</i> ) and Deuteromycotina ( <i>Cercospora</i> ). Importance of mycorrhizal association.
<b>II</b>	<b>ECONOMIC IMPORTANCE OF FUNGI:</b> Cultivation of mushroom – <i>Pleurotus</i> (food). Fungi in agriculture application (biofertilizers): Mycotoxins (biopesticides), Production of industrially important products from fungi- alcohol (ethanol), organic acids (citric acid), enzymes (protease). Vitamins (Vitamin B-complex and Vitamin B-12), applications of fungi in pharmaceutical products (Penicillin). Importance of VAM fungi - Agriculture (Biofertilizers); Harmful effects of Fungi - Mycotoxins
<b>III</b>	<b>BACTERIA, VIRUS:</b> Classification (Bergey’s, 1994), General characters, structure and reproduction of bacteria, Mycoplasma, Virology -Viruses general characters, structure and reproduction.
<b>IV</b>	<b>PLANT PATHOLOGY:</b> General symptoms of plant diseases; Geographical distribution of diseases; Etiology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of the following plant diseases. <b>Bacterial diseases</b> – Citrus canker and Bacterial wilt of Banana <b>Viral diseases</b> – Tobacco Mosaic and Vein clearing of Papaya <b>Fungal diseases</b> – Blast disease in rice and Tikka disease
<b>V</b>	<b>LICHEN:</b> Classification (Hale, 1969). Habitat, nature of association, Structure, Nature of Mycobionts and Phycobionts, Study of growth forms of lichens (crustose, foliose and fruticose), distribution, thallus organization, reproduction and ecological significance of lichens with special reference to <i>Usnea</i> . <b>Economic importance of Lichens:</b> food, fodder and nutrition, flavor, tanning and dyeing, cosmetics and perfumes, Brewing and distillation, minerals, Natural products, medicine (Ayurvedic, Siddha), pharmaceutical products, biodegradation agent, air pollution and biomonitoring, soil formation, nitrogen fixation, Harmful aspects, poison from lichens,
Extended Professional Component (is a part of internal component)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved  (To be discussed during the Tutorial hour)

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<p>only, Not to be included in the External Examination question paper)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p><b>Recommended Texts</b></p>	<ol style="list-style-type: none"> <li>1. Pandey, B.P. 1997. College Botany. Vol. I Fungi &amp; Pathology.</li> <li>2. Mehrotra, R.S and Aneja, K.R. 2003. An introduction to mycology. New age International (P) Ltd, Publishers, New Delhi.</li> <li>3. Poonam Singh and Ashok Pandey. 2009. Biotechnology for agro-Industrial residues utilization. Springer.</li> <li>4. Satyanarayana T and Johri B.N. 2005. Microbial diversity, Current Perspectives and Potential Applications, IK International.</li> <li>5. Nair, L.N. 2007. Topics in Mycology and Pathology, New Central Book agency, Kolkata.</li> <li>6. Sharma, P.D. 2011. Plant Pathology, Rastogi Publication, Meerut, India.</li> <li>7. Mahendra Rai. 2009. Advances in Fungal Biotechnology. I.K. International Publishing House, New Delhi.</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. 1996. Introductory Mycology. 4th edition. John Wiley &amp; Sons (Asia) Singapore.</li> <li>2. Webster, J and Weber, R. 2007. Introduction to Fungi. 3rd edition. Cambridge University Press, Cambridge.</li> <li>3. Sharma, O.P. 2011. Fungi and allied microbes The McGraw –Hill companies, New Delhi.</li> <li>4. Burnett, J.H. 1971. The fundamentals of Mycology. ELBS Publication, London.</li> <li>5. Bessey, E.A. 1979. Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.</li> <li>6. Dharani Dhar Awasthi. 2000. A Handbook of Lichens Vedams eBooks (P) Ltd. New Delhi.</li> <li>7. Pelzer, M.J., Chan, E.C.S and Krieg, N.R. 1983. Microbiology , Tata MaGraw Hill Publishing House, New Delhi.</li> <li>8. Pandey, P.B. 2014. College Botany- 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi.</li> <li>9. Mishra, A. and Agarwal, R.P. 1978. Lichens – A Preliminary Text. Oxford</li> </ol>

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	and IBH. 10. Pandey, B.P. 2005. College Botany I: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S Chand & Company
<b>Web Resources</b>	<ol style="list-style-type: none"> <li>1. <a href="https://www.amazon.in/Fungi-Sarah-C-Watkinson-ebook/dp/B0199YFDFE">https://www.amazon.in/Fungi-Sarah-C-Watkinson-ebook/dp/B0199YFDFE</a></li> <li>2. <a href="http://www.freebookcentre.net/biology-books-download/A-text-book-of-mycology-and-plant-pathology.html">http://www.freebookcentre.net/biology-books-download/A-text-book-of-mycology-and-plant-pathology.html</a></li> <li>3. <a href="http://www.freebookcentre.net/Biology/Mycology-Books.html">http://www.freebookcentre.net/Biology/Mycology-Books.html</a></li> <li>4. <a href="https://www.kobo.com/us/en/ebook/introduction-to-fungi">https://www.kobo.com/us/en/ebook/introduction-to-fungi</a></li> <li>5. <a href="http://www.freebookcentre.net/biology-books-download/Introductory-Mycology.html">http://www.freebookcentre.net/biology-books-download/Introductory-Mycology.html</a></li> <li>6. <a href="http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html">http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html</a></li> </ol>

**Mapping with Programme Outcomes:**

COs	COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	3	1	3	2	1	2	2	2	2
<b>CO 2</b>	3	3	2	2	3	3	2	1	2	1
<b>CO 3</b>	2	2	3	3	1	2	1	3	1	3
<b>CO 4</b>	3	3	3	3	3	2	3	3	3	3
<b>CO 5</b>	3	3	2	3	2	3	3	3	3	3

**S-Strong (3)**

**M-Medium (2)**

**L-Low(1)**