

<b>Content:</b>		<b>(30)</b>
1.	Isolation of plant growth promoting bacteria from rhizosphere and screening for phosphate/zinc solubilisation, IAA production, K mobilisation, siderophore activity and seedling vigour test.	
2.	Detection of microbial enzymes – amylase, phosphatase, lipase, protease, catalase, urease from various soils such as sandy soil and garden soil.	
3.	Isolation of microbial plant pathogen(s)-bacterial/fungal.	
4.	Preparation of biofertilizer using cyanobacteria	
<b>Pedagogy:</b>	Hands-on experiments in the laboratory, video, online data	
<b>References/Readings</b>	As given under Theory Course <b>MITE-403</b>	
<b>Learning Outcomes</b>	Integrate the knowledge of soil microorganisms for the betterment of agriculture.	

**Programme: M.Sc. (Microbiology)**

**Course Code: MITE-404**

**Title of the Course: MYCOLOGY [T]**

**Number of Credits: 3, Theory**

**Contact hours: 45**

**Effective from Academic Year: 2022-23**

<b>Prerequisites</b>	The student should be familiar with basic microbiology.	
<b>Objective:</b>	This course deals with classification and identification of fungi, fungal diversity, genetics and their applications.	
<b>Content:</b>		
<b>1.</b>	<b>Fungal diversity and distribution</b>	<b>(15)</b>
<b>1.1</b>	<b>Origin and phylogeny; classification</b>	
<b>1.2</b>	<b>Fungi – Terrestrial and Aquatic</b>	
A.	Terrestrial fungi; Aquatic Fungi: Fresh water fungi; Marine fungi: Coastal and Mangrove, Estuarine, Open Ocean, Polar regions.	
B.	Fungal diversity in Hypersaline waters – Thalassohaline and Athalassohaline: Solar salterns, Salt Lake, Dead Sea.	
<b>1.3</b>	<b>Extremophilic Fungi</b>	
	Oligotrophs, Alkaliphiles, Acidophiles, Barophiles, Psychrophiles, Thermophiles, Halophiles, Osmophiles, Xerophiles.	
	Fungal adaptation to extreme environments.	
<b>2.</b>	<b>Physiology and Genetics</b>	<b>(15)</b>
<b>2.1</b>	<b>Physiology of fungi</b>	
A.	Growth and development.	
B.	Fungal hormones- attractants, morphogenesis and differentiation.	
C.	Microbial interactions.	
D.	Secondary metabolites: antimicrobials, mycotoxin, pigments.	
<b>2.2</b>	<b>Fungal genetics</b>	
	<i>Neurospora</i> and <i>Saccharomyces</i> : Life-cycle; Tetrad analysis, gene conversion; Deuteromycotina: parasexuality, cytoplasmic inheritance; Electrophoretic karyotyping.	
<b>2.3</b>	<b>Identification of fungi</b>	

A.	Colonial and morphological characteristics, standard keys for identification of fungi.	
B.	Molecular finger printing.	
<b>3.</b>	<b>Pathogenesis - Antifungal Therapy</b>	<b>(08)</b>
<b>3.1</b>	<b>Pathogenesis</b>	
A.	Mycoses - Systemic, sub-cutaneous, cutaneous and superficial, Opportunistic	
B.	Plant pathogens.	
<b>3.2</b>	<b>Antifungal Therapy</b>	
	Drugs acting on cell membrane, protein synthesis inhibitors; fungicides.	
<b>4.</b>	<b>Applications</b>	<b>(07)</b>
A.	Industrially important enzymes.	
B.	Bioprospecting of secondary metabolites: Antimicrobials, antitumour agents, nutraceuticals, pigments,.	
C.	Biodegradation and bioremediation.	
D.	Biocontrol	
E.	Edible Mushrooms	
<b>Pedagogy:</b>	Lectures/tutorials/assignments	
<b>References/ Readings</b>	Alexopoulos, C.J., Mims, C.W. and Blackwell, M., Introductory Mycology, John Wiley & Sons (Asia) Pvt. Ltd.	
<b>(Latest editions)</b>	Cooke, R. C. and Whipps, J. M., Ecophysiology of fungi, Blackwell Scientific Publications, Oxford.	
	Davis, B. D., Dulbecco, R., Eisen, H. N. and Ginsberg, H. S., Microbiology, Harper and Row.	
	Deacon, J. W., Introduction to Modern Mycology, Volume 7 of Basic Microbiology, Blackwell Scientific Publications.	
	Domsch, K. H., Gams, W. and Anderson, T-H., Compendium of Soil Fungi, IHW-Verlag.	
	Gilman, J. C. and Joseph, C., A Manual of Soil Fungi, Daya Books.	
	Kendrick, B., The Fifth Kingdom, Focus Publishers.	
	Mehrotra, R. S. and Aneja, K. R., An Introduction to Mycology, Wiley Eastern Limited.	
	Onions, A. H. S., Allsop, D. and Eggins, M. O. W., Smith's Introduction to Industrial Mycology, Edward Arnold, London.	
	Strickberger, M. W., Genetic, The MacMillan Company, New York.	
<b>Learning Outcomes</b>	Apply the knowledge in identification and bioprospecting of fungi.	