UNIVERSITY OF MADRAS

M.Sc. DEGREE PROGRAMME IN BOTANY

SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Course	**AGRICULTURE AND FOOD MICROBIOLOGY**						
Paper Number	**Skill Enhancement-II**						
Category	SKILL ENHANCEMENT	**Year**	I	**Credits**	2	**Course Code**	523S3A
		Semester	II				

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**
	2	-	-	2

Pre-requisite	To understand the benefits of microbes in agriculture and food industry.
Learning Objectives:	
C1	To provide comprehensive knowledge about plant – microbe interactions.
C2	To provide basic understanding about factors affecting growth of microbes
C3	To appreciate the role of microbes in food preservation.
C4	To understand about the benefits of microbes in agriculture and food industry.
C5	To gain knowledge about practices involved in food industry.

UNIT	**CONTENTS**
I	**ROLE OF MICROORGANISMS IN AGRICULTURE** Role of symbiotic and free-living bacteria and cyanobacteria in agriculture. Mycorrhiza, Plant Growth Promoting Microorganims (PGPM) and Phosphate Solubilizing Microorganims (PSM).
II	**BIOCONTROL AND BIOFERTILIZATION** Biocontrol of plant pathogens, pests and weeds, Restoration of waste and degraded lands, Biofertilizers: Types, technology for their production and application, vermi-compost.
III	**FOOD MICROBIOLOGY** Intrinsic and extrinsic factors influencing growth of microorganisms in food, Microbes as source of food: Mushrooms, single cell protein.
IV	**FOOD MICROBIOLOGY** Microbial spoilage of food and food products: Cereals, vegetables and fruits products. Food poisoning and food intoxication.
V	**FOOD PRESERVATION PROCESSES** Microbes and fermented foods: Butter, cheese and bakery products.

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Course outcomes: CO	**On completion of this course, the students will be able to:**	**Programme outcomes**
CO1	Recognize the general characteristics of microbes and factors affecting its growth.	K1
CO2	Explain the significance of microbes in increasing soil fertility.	K2
CO3	Elucidate concepts of microbial interactions with plant and food.	K3
CO4	Analyze the impact of harmful microbes in agriculture and food Industry.	K4
CO5	Determine and appreciate the role of microbes in food preservation and as biocontrol.	K5

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	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)
Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. Pelczar M.J., Chan E.C.S. and Krieg N.R. 2003. Microbiology. 5th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Subba Rao, N. S. 2000. Soil microbiology. 4th Edition, Oxford and IBH publishing Co. Pvt. Ltd., Calcutta, New Delhi, India.
3. Rangaswami, G. and Bagyaraj, D.J. 2006. Agricultural Microbiology. 2nd Unit 2nd Edition, PHI Learning, New Delhi, India.
4. Prescott, L.M., Harley J.P., Klein D. A. 2005. Microbiology, McGraw Hill, India. 6th edition.
5. Goldman, E. and Green, L.H. 2015. Practical Handbook of Microbiology (3rd Ed.). CRC Press.

Reference Books:

1. Adams, M.R. and Moss M. O. 2008. Food Microbiology, 3rd Edition, Royal Society of Chemistry, Cambridge, U.K.
2. Sylvia D.M. 2004. Principles and Applications of Soil Microbiology, 2nd Edition, Prentice Hall, USA.
3. Frazier, W.C. 1995. Food Microbiology, 4th Edition, Tata McGraw Hill Education, Noida, India.
4. Waites M.J., Morgan N.L., Rockey J.S. and Higton G. 2001. Industrial Microbiology: An Introduction. 1st Edition, Blackwell Science, London, UK.
5. Das, S. and Saha, R. 2020. Microbiology Practical Manual. CBS Publishers and Distributors (P) Ltd., New Delhi, India.

Web resources:

1. https://www.kopykitab.com/Agriculture-And-Food-Microbiology-In-Hindi-by-Dr-Q-J-Shammi
2. https://agrimoon.com/agricultural-microbiology-icar-ecourse-pdf-book/
3. https://play.google.com/store/books/details/Applied_Microbiology_Agriculture_Environmental_Foo?id=DgVLDwAAQBAJ&hl=en_US&gl=US
4. https://www.scientificpubonline.com/websitebooks/ebooks/agriculture/microbiology
5. https://www.amazon.in/Food-Microbiology-Martin-R-Adams-ebook/dp/B01D6B7V6A

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	1	2	2	2	1
CO2	3	3	2	2	3	3	2	3	3	3
CO3	2	2	3	3	1	2	1	3	1	2
CO4	3	3	3	3	3	2	3	3	3	2
CO5	3	3	2	3	2	3	3	3	2	3

S-Strong (3) M-Medium (2) L-Low(1)