Annexure 2

SEMESTER 1

MIC 401: Diversity of Prokaryotic and Eukaryotic Microorganisms

COURSE CODE: MIC 401
NO. OF CREDITS: 04

COURSE OUTCOMES (COs)

- **CO1** Imparting knowledge of microbial diversity including important microbesimpacting health, environment, and industries.
- **CO2** Identifying the importance of microbial diversity and Bacterial systematics.
- **CO3** Understanding and distinguishing various genera of Yeasts, molds, andextremophiles.
- **CO4** Knowing the Ecological importance and economic uses of microbes as awhole.

Unit 1: Principles of Microbial Diversity

- History of microbial diversity, concepts of the Tree of Life
- Principles of Microbial Diversity and Taxonomy: Morphological, Biochemical, Chemical and Numerical
- Methods of studying microbial diversity: Classical and Molecular approaches,Microbial phylogeny
- Concept of Metagenomics and methods of assessment non-cultivable microbialdiversity

Unit 2: Bacterial Systematics

- Green phototrophic bacteria/cyanobacteria,
- Proteobacteria: α, β, γ, δ, ε
- Gram-positive bacteria, High G+C bacteria, *Actinomycetes*, *Spirochetes &Bacteroides*, *Deinococci*, *Chlamydiae*, *Planctomycetes*
- Bacterial phyla and non-cultivable species

Unit 3: Diversity of yeast and molds

- Structure, Reproduction, classification of molds and yeast, life cycle ofimportant examples
- Fungal cell factories: pharmaceuticals and enzymes
- Fungal diseases in plants and animals
- Mycotoxins and their significance
- Environmental Importance of Fungal Associations: Mycorrhizal fungi and lichens

Unit 4: Diversity of Archaea

- Systematics occurrence, diversity, and classification of archaea
- Characteristics features of different groups of archaea
- Alkaliphiles: alkaline environments, genera of alkali-tolerant and alkaliphilic microorganisms, homeostasis of the pH, adaptation mechanisms, biotechnological applications
- Acidophiles: diversity of acidic environments, phylogenetic relationship, energy metabolism, cellular and molecular adaptation mechanisms, biotechnological applications
- Thermophiles: distribution, physiological, biochemical, and molecular adaptations to life at high temperature, biotechnological applications
- Halophiles: occurrence and ecosystem, cell architecture, biochemical andmolecular strategies to life at high salinity, biotechnological applications

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REFERENCE

No.	Name	Author
1.	A guide to identifying and classifying yeast	Burnet et.al
2.	Agricultural statistics-techniques and procedures	Mandal & Nambiar
3.	Analytical biochemistry	D.J. Holme & H.Peck
4.	Annual review of microbiology	Volumes
5.	Bacteria in their natural environment	Fletcher
6.	Bacterial metabolism	Gottschalk, G.
7.	Bacterial respiration and photosynthesis	C.W. Jones
8.	Bergey's Manual of Systematic Bacteriology vol.: I-V	Krieg & Holt
9.	Biodiversity of microbial life	Ed. J. T. Staley & A.L. Reysenbach
10.	Bioinformatics databases, tools, and algorithms	O. Bosu & S. K. Thukral
11.	Biology of the conidial fungi	Cole & Kendrick
12.	Biology of the fungi	I.K. Ross
13.	Brock's Biology of the Microorganisms 8th edition	M.T.Madigan, T.M.
14.	Microbial diversity	Colwd. D
15.	Microbial ecology	Bartha and Atlas, Pearson Edu
16.	Molds and filamentous fungi in technical microbiology	O. Fassatiova

WEBLINKS

1. Strategies and challenges for the development of industrial enzymes using fungalcell factories:
https://link.springer.com/chapter/10.1007/978-3-030-29541-7_7
2. Growing a circular economy with fungal biotechnology: a white paper:
https://fungalbiolbiotech.biomedcentral.com/articles/10.1186/s40694-020-00095- z
3. Fungal biology. Deacon, J. W. (2013). John Wiley & Sons:
https://yeastwonderfulworld.files.wordpress.com/2016/10/fungal-biology.pdf
4. Fungi: Biology and applications:
https://www.wiley.com/en-us/Fungi%3A+Biology+and+Applications%2C+3rd+Edition-p-9781119374275
5. Yeast biotechnology: teaching the old dog new tricks:
https://link.springer.com/article/10.1186/1475-2859-13-34
6. Yeast as a Versatile Tool in Biotechnology. In A. Morata, & I. Loira (Eds.), Yeast - Industrial Applications:
https://www.intechopen.com/chapters/56515

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