**Name of the Programme:** M.Sc. Biotechnology

**Course Code:** GBT-500

**Title of the Course:** MICROBIOLOGY

**Number of Credits**: 3

**Effective from AY:** 2022-23

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| **Pre-requisites for the Course:** | No prerequisite is required. | |
| **Course Objectives:** | The objective of this course is to provide information about<br>1) the types of microbes, their growth characteristics.<br>2) their nutrition, general characteristics and classification. | |
| **Content:** | **MODULE I**<br><br>· A brief history of microbiology: discovery of the microbial world, controversy over spontaneous generation, the role of microorganisms in the causation of disease, development of pure enrichment culture methods.<br>· Modern /contemporary microbiology in the 21st century<br>· An overview of the organization and cell structure of Prokaryotes and Archaea: i) cell wall ii) outer membrane iii) cytoplasmic membrane iv) flagella & specialized movements in microbes v) cell inclusions iv) differences among the groups. | **No. of hours**<br><br>15 |
| | **MODULE II**<br><br>Microbial nutrition: i) autotrophic & heterotrophic modes, ii) defining culture media to support growth, iii) Selective and differential culture media.<br>Bacterial growth kinetics: i) growth curve, the mathematical expression of growth & measurement of growth ii) synchronous growth iii) factors affecting growth iv) chemostat & turbidostat.<br>Microbial taxonomy: i) nomenclature ii) polyphasic identification, traditional & molecular, iii) Bergey's manual. | 15 |

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| | **MODULE III**<br><br>1. Structure & classification.<br>• Algae<br>• Fungi<br>• Cyanobacteria<br>• Bacteria<br>• Viruses<br>• Viroids & prions<br><br>2. Specialized microorganisms:<br>• Marine microbes.<br>• Extremophiles: barophiles, psychrophiles, thermophiles, halophiles, acidophiles<br>• Anaerobes | 15 |
| **Pedagogy:** | Lectures, tutorials, assignments | |
| **References/ Readings:** | 1. Atkins, de Paula. Physical Chemistry for the Life Sciences (2nd Edition). W.H. Freeman, 2011.<br>2. R.M. Atlas, Microbiology: Fundamentals and Applications. World Cat Publisher, 1989.<br>3. Collins, Granje J., Lyne, P. M. Falkenheim J. Microbiology Methods Hodder Arnold Publication, 2004.<br>4. T E. Ford, Aquatic Microbiology: An ecological approach. Blackwell Scientific Publication, 1993.<br>5. G. Reed, Prescott & Dunn. Industrial Microbiology CBS Publishers. 1987.<br>6. R.A. Harvey, C.N. Cornelisse, Lippincott Illustrated Reviews: Microbiology (Lippincott Illustrated Reviews Series) LWW publisher, 2012.<br>7. M. Madigan, K.M. Bender, D. Buckley, W. Sattley, D Stahl. Brock Biology of Microorganisms. Pearsons, 2018.<br>8. M. Madigan, Martinko & Parker, J. Rock's Biology of microorganisms. Pearson Prentice Hall, 2010.<br>9. M.J. Pelczar, E.C.S. Chan and Krige. Microbiology Tata Macgrw Hill, 2004.<br>10. G. Rheinhemer. Aquatic Microbiology Wiley and sons, 1980.<br>11. R.Y. Stanier, J.L. Ingraham General Microbiology. Palgrave Macmillan, 1999.<br>12. G. Tortora, B. Funke, C. Case. Microbiology: An Introduction. Pearson, 2018.<br>13. J. Willey, L. Sherwood, C.J. Woolverton. Prescott's Microbiology. | |

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| | Mcgraw Hill, 2016. |
| **Course Outcomes:** | After completing this course, students would be able to<br>1. Distinguish different types of microorganisms.<br>2. Understand the morphology, nutrition and classification of various microbes.<br>3. Analyse the growth characteristics of different microorganisms.<br>4. Gain a basic understanding on the diversity of microorganisms in different extreme environments and their application. |

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