Syllabus for Master of Science in Biotechnology

Subject Code: 02BT0404

Subject Name: Microbiology (Core)

M. Sc. Semester-I

Objectives: To make students aware with basic understanding of microorganisms based on their Growth requirement, classification and Diversity.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, students will be able to

1. Acquire, articulate, retain and apply specialized language and knowledge relevant to Microbiology.
2. Understands the Classification, Diversity and nomenclature of microorganism.
3. Understand the nutritional requirements of microorganisms, growth pattern.
4. Apply different techniques for isolation and preservation of microorganisms in the routine laboratory.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Practicals/ TW	
4	0	0	4	50	30	20	0	0	150

Contents:

Unit	Topics	Contact Hours
1	**Introduction to Microbiology** The history and scope of Microbiology. Nutrient requirements of organisms. Nutritional types of organisms. Types of culture media. Isolation and Preservation of pure culture. Bacterial Growth curve. Measurement of microbial growth. The continuous culture of microorganisms and Influence of environmental factors on growth. Microscopy.	15
2	**Microbial Diversity** General Characteristics, Classification and Economic importance of Archaea, Bacteria, Fungi, Algae, Protozoa and Viruses.	15
3	**Classification of Microorganisms** The study of phylogenetic relationship of microorganisms: The three domains, A phylogenetic hierarchy. Classification of Organisms: Scientific Nomenclature, The taxonomic hierarchy, Classification of Prokaryotes, Eukaryotes and Viruses. Methods of Classifying and Identifying Microorganisms: Morphological characteristics, Differential staining, Biochemical test, Serology, DNA Base Composition, DNA Fingerprinting, Nucleic Acid Hybridization and Cladogram.	15
4	**Control of Microorganisms** Physical Method: Heat, Low temperature, Radiation, Filtration. Chemical Method: Phenolics, Alcohols, Halogens, Heavy metals, Quaternary ammonium compounds, Aldehydes, Sterilizing gases. Phenol co-efficient method. Antimicrobial agents: Antibiotics, Antifungal agent and Antiviral agent. Diagnostics of ESBL, MBC, MRSA, VRSA, MDR-TB, XDR-TB.	15
	Total Hours	60

Recommended Textbooks:

1. Pelczar, M.J., Chan E.C.S., Krieg, N.R., (1993) Microbiology, 5th Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
2. Prescott, L.M., Harley, J.P. and Klein, D.A., (2002) Microbiology 5th Edition. Tata McGraw Hill Book Company.
3. Powar and Daginawala, (2012) General Microbiology Vol-I. Himalaya Publishing House, Mumbai.
4. Moat, A.G. and Foster, S.W., (2004) Microbial Physiology, 4th Ed. John Wiley and Sons, New York.
5. Stanier, R.Y., Iingraham, J.L., Wheelis, M.L., Painter, R.K., (1987) General Microbiology, 5th Edition. MacMillan Press Ltd., London.
6. Atlas. R.M., (2015) Principles of Microbiology- 2 nd Edition. Tata McGraw Hill Education Pvt. Ltd. New Delhi.
7. Dubey. R.C., Maheshwari. D.K., (1991) Practical Microbiology, S.Chand & Company Ltd., New Delhi.
8. Patel. R.J., Patel. K.R., (2016) Experimental Microbiology, Vol-I, Aditya Publications, Ahmedabad, India.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	30%	20%	15%	10%	5%

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.