

VANITA VISHRAM WOMEN'S UNIVERSITY

(Managed By: Vanita Vishram, Surat)

1st Women's University of Gujarat



**VANITA VISHRAM
WOMEN'S UNIVERSITY**
— SURAT —

SCHOOL OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF MICROBIOLOGY

B.SC. MICROBIOLOGY

SEMESTER II

SYLLABUS

AS PER NEP-2020

W.E.F 2023-24



VANITA VISHRAM WOMEN'S UNIVERSITY, SURAT
SCHOOL OF SCIENCE AND TECHNOLOGY
Department of Microbiology
BSc Microbiology Program
F.Y. B.Sc.
Semester II

MBM203-1C: Microbial Growth, Nutrition & Control (T)

Credit 3T+1P

Contact Hour per week 3+2

Outline of the Course:

Course type	Theory+ Practical
Level of the Course	200-299 Intermediate level
Course category	Discipline specific course (Major)
Purpose of Course	The main purpose of this course is to give students knowledge about the nutritional requirements of microorganisms and how those nutrients are transported inside the cell. Additionally, it also inculcates the information about the growth pattern and measurement of microorganisms. The course gives knowledge of media used for various purposes along with their ingredients along with the methods and factors to be considered for culturing microbes in the laboratory conditions
Course Objectives	<ul style="list-style-type: none">• Students may gain good knowledge of the nutritional requirements of microorganisms and different transport mechanisms occur in them.• Understand the growth pattern and how to calculate numbers of microorganism and their applications• Understand the methods for culturing the microorganism• Understand the various approaches to control microbial contaminations.
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review /	Dec 2023



Revision	
Pre-requisite	Elementary knowledge of Biology.
Teaching Methodology	Class Room Teaching, Discussion and Assignments, laboratory practical
Evaluation Method	Continuous And Comprehensive Evaluation (CCE) (50%) Semester End Evaluation (SEE) (50%)

Units	Particulars	% Weightage of Unit	Minimum Nos. of Hours
1	Nutritional Requirement of Microorganisms Common Nutritional requirement, Physical and chemical requirement for the growth, Nutritional Types of bacteria, Uptake of Nutrients – mechanisms of Nutrient uptake	20 %	09
2	Bacterial Growth Bacterial cell cycle, The Growth Curve, Measurement of bacterial growth (Methods of enumeration), Continuous culture of microorganism, Environmental factors affecting microbial growth (Temperature, pH, Oxygen concentration, Solute and water activity, Pressure and Radiation)	28 %	13
3	Control of microorganisms I – Definitions for microbial control, Pattern of microbial death Mode of actions of antimicrobial agents Physical methods of microbial control Heat (Dry, Moist), Refrigeration & Desiccation, Radiation, Sonic and Ultrasonic waves, Osmotic pressure	20 %	09
4	Control of microorganisms II – Chemical methods for microbial control	32 %	14



	Phenolic, Alcohols, Halogens, Quaternary ammonium compounds, Aldehydes, Sterilizing gasses, Heavy metals, Factor affecting effectiveness of antimicrobial agents Antimicrobial Chemotherapeutic agents Characteristics of an ideal antimicrobial agents, Assays to determine antimicrobial activity, Brief introduction to antimicrobial agents		
MBM203-1C: Microbial Growth, Nutrition & Control (P)			
Practical <ol style="list-style-type: none">1. Enumeration of bacterial by heterotrophic plate count (HPC) method2. Effect of pH, temperature and osmotic pressure on bacterial growth3. Determination of TDP & TDT.4. Antibiotic susceptibility test by disc diffusion method5. Lethal action of U.V rays on bacteria6. Lethal action of heavy metals on bacteria7. Study and plot growth curve of Escherichia coli (Demonstration)			
References books: <ol style="list-style-type: none">1. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore, (2004).2. Prescott, M.J., Harley, J.P. and Klein, D.A. Microbiology. 10th Edition WCB McGraw Hill, New York, (2002).3. Black J.G. Microbiology- Principles and Explorations. John Wiley & Sons Inc. New York, (2002).4. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill.5. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson6. Eugene W. Nester, Denise G. Anderson, C. Evans Roberts, Martha T. Nester. Microbiology, a Human Perspective, 6th Edition, Mc GRAW-HILL.			



7. H. A. Modi. Handbook of Elementary Microbiology Vol.1. Akta Prakashan
8. Patel, R. J., & Patel, R. K., (2015). Experimental Microbiology, Vol. 1, 9th ed., Aditya.
9. Cappuccino, J.G., (2016). Microbiology: A Laboratory Manual, 11th ed., Pearson Education (Singapore) Pvt. Ltd.
10. Aneja, K.R., (2003). Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology, 4th ed., New Age International Publishers.

COURSE OUTCOMES:

CO1	Students will understand the nutritional requirements and different transport mechanisms in microorganisms
CO2	Students will gain knowledge regarding the growth pattern and enumeration of microorganism and their applications
CO3	Students will understand about various physical methods to control microbial contamination
CO4	Students will understand about various chemical methods to control microbial contamination

COURSE OUTCOMES MAPPING

Unit No	Title of the Unit	Course Outcome			
		CO1	CO2	CO3	CO4
1	Nutritional Requirement of Microorganisms				
2	Bacterial Growth				
3	Control of microorganisms I				
4	Control of microorganisms II				

COURSE ARTICULATE MATRIX

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1						
CO2						
CO3						
CO4						



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Department of Microbiology
BSc Microbiology Program
F.Y. B.Sc.
Semester II

MBM204-1C: Microbial Diversity (T)

Credit 3T+1P

Contact Hour per week

3+2

Outline of the Course:

Course type	Theory
Purpose of Course	The main objective of course is to understand structural morphological and physiological characteristics of diverse group of microbial world. Student will learn structure, taxonomy, nomenclature and classifications well as Isolation, purification and cultivation of viruses, fungi, algae, protozoa and parasites in this course.
Course Objective	CO 1. The course gives knowledge about morphological and physiological characterization of viruses CO 2. The course gives knowledge about the biology of bacteriophages and variety of plant viruses and animal viruses CO 3. The course characterize fungi and algae along with their ecological and economic applications CO 4. The course describes and characterize protozoa and parasitic members of microbial world fungi and algae along with their ecological and economic applications
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	Dec 2023
Pre-requisite	Elementary knowledge of Biology.
Teaching Methodology	Class Room Teaching, Discussion and Assignment



Evaluation Method	Continuous And Comprehensive Evaluation (CCE) (50%) Semester End Evaluation (SEE) (50%)
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Units	Particulars	% Weightage of Unit	Minimum Nos. of Hours
1	Virology I History and General Characteristics of viruses, Component & structure of viruses, Taxonomy & Classification of viruses (Baltimore Classification), Isolation, cultivation & enumeration of viruses, Viral Transmission	20 %	10
2	Virology II Replication of Bacteriophage (lytic & Lysogenic), Replication of animal virus, One step Growth curve of bacteriophage, Plant viruses and viroids, Satellite viruses, Prions, Oncogenic viruses & Cancer	20 %	10
3	Mycology & Phycology Fungi - Characteristics of fungi (structure, habitat & diversity), Fungal Reproduction, Medically important fungi (Zygomycota, Ascomycota, Basidiomycota, Microsporidia), Common Fungal Diseases Algae - Characteristics of algae, Occurrence & Distribution, Reproduction of algae, Economic importance of algae	32 %	14
4	Protozoology & Parasitology Protist - Protist Characteristics (Morphology & Habitat), Encystment & Excystment, Protist reproductive cells and Structures, Importance of protest Parasites – Characteristics and diseases of Arthropods (Mosquitoes, Fleas, Lice, Ticks, Mites)	28 %	13



	Characteristics and diseases of Helminths (Nematodes, Cestodes, Trematodes)		
MBM204-1C: Microbial Diversity (P)			
Practical			
<ol style="list-style-type: none">1. Study of the structure of important plant, animal and bacterial viruses by using electron microscope micrographs2. Isolation and enumeration of bacteriophages (PFU) from water/sewage sample using double agar layer technique.3. Preparation of mycological cultural media4. Study of economically important fungi. (Aspergillus, Penicillium, Mucor, Rhizopus, Curvularia, Helminthosporium, Fusarium, Alternaria)5. Isolation of protozoa from soil6. Isolation of common algae from natural samples7. Study of permanent slides of algae (Volvox, Spirogyra, Diatoms, Nostoc, Anabaena)8. Study of permanent slides of arthropod vector (mosquitoes, rat flea, mite, teak)			
References books:			
<ol style="list-style-type: none">1. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore, (2004).2. Prescott, M.J., Harley, J.P. and Klein, D.A. Microbiology. 10th Edition WCB McGraw Hill, New York, (2002).3. Black J.G. Microbiology- Principles and Explorations. John Wiley & Sons Inc. New York, (2002).4. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill.5. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson6. Eugene W. Nester, Denise G. Anderson, C. Evans Roberts, Martha T. Nester. Microbiology, a Human Perspective, 6th Edition, Mc GRAW-HILL.			



7. Mehrotra, R.S. and K.R.Aneja. An Introduction to Mycology. New Age International Press, New Delhi
8. V. S. S. Sambamurty. A Textbook of Algae. I.K. International Publishing House Pvt. Limited, 2010
9. H. A. Modi. Handbook of Elementary Microbiology Vol.1. Akta Prakashan
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COURSE OUTCOMES:

CO1	Students will get knowledge about morphological and physiological characterization of viruses
CO2	Students will have knowledge about the biology of bacteriophages and variety of plant viruses and animal viruses
CO3	Students can characterize fungi and algae along with their ecological and economic applications
CO4	Students can describes and characterize protozoa and parasitic members of microbial world fungi and algae along with their ecological and economic applications ns

COURSE OUTCOMES MAPPING

Unit No	Title of the Unit	Course Outcome			
		CO1	CO2	CO3	CO4
1	Virology I				
2	Virology II				
3	Mycology and Phycology				
4	Protozoology and Parasitology				

COURSE ARTICULATE MATRIX

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6



CO1						
CO2						
CO3						
CO4						



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Semester II

MBE202-1C: Diversity of Microbial World (T) (Minor)

Credit 3T+1P

Contact Hour per week

3+2

Outline of the Course:

Course type	Theory
Purpose of Course	The main objective of course is to understand structural morphological and physiological characteristics of diverse group of microbial world. Student will learn structure, taxonomy, nomenclature and classifications well as Isolation, purification and cultivation of viruses, fungi, algae, protozoa and parasites in this course.
Course Objective	CO 1. The course gives knowledge about morphological and physiological characterization of viruses CO 2. The course gives knowledge about the biology of bacteriophages and variety of plant viruses and animal viruses CO 3. The course characterize fungi and algae along with their ecological and economic applications CO 4. The course describes and characterize protozoa and parasitic members of microbial world fungi and algae along with their ecological and economic applications
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	Dec 2023
Pre-requisite	Elementary knowledge of Biology.



Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	Continuous And Comprehensive Evaluation (CCE) (50%) Semester End Evaluation (SEE) (50%)

Units	Particulars	% Weightage of Unit	Minimum Nos. of Hours
1	Introduction to Viruses History and General Characteristics of viruses, Component & structure of viruses, Taxonomy & Classification of viruses (Baltimore Classification), Isolation, cultivation & enumeration of viruses, Viral Transmission	20 %	10
2	Reproduction and Diversity of Viruses Replication of Bacteriophage (lytic & Lysogenic), Replication of animal virus, One step Growth curve of bacteriophage, Plant viruses and viroids, Satellite viruses, Prions, Oncogenic viruses & Cancer	20 %	10
3	Introduction to fungi and algae Fungi - Characteristics of fungi (structure, habitat & diversity), Fungal Reproduction, Medically important fungi (Zygomycota, Ascomycota, Basidiomycota, Microsporidia), Common Fungal Diseases Algae - Characteristics of algae, Occurrence & Distribution, Reproduction of algae, Economic importance of algae	32 %	14
4	Introduction to Protista and Parasites Protist - Protist Characteristics (Morphology & Habitat), Encystment & Excystment, Protist reproductive cells and Structures, Importance of protest	28 %	13



	Parasites – Characteristics and diseases of Arthropods (Mosquitoes, Fleas, Lice, Ticks, Mites) Characteristics and diseases of Helminths (Nematodes, Cestodes, Trematodes)		
MBM202-1C: Diversity of Microbial World (P)			
Practical			
<ol style="list-style-type: none">1. Study of the structure of important plant, animal and bacterial viruses by using electron microscope micrographs2. Isolation and enumeration of bacteriophages (PFU) from water/sewage sample using double agar layer technique.3. Preparation of mycological cultural media4. Study of economically important fungi. (Aspergillus, Penicillium, Mucor, Rhizopus, Curvularia, Helminthosporium, Fusarium, Alternaria)5. Isolation of protozoa from soil6. Isolation of common algae from natural samples7. Study of permanent slides of algae (Volvox, Spirogyra, Diatoms, Nostoc, Anabaena)8. Study of permanent slides of arthropod vector (mosquitoes, rat flea, mite, teak)			
REFERENCE			
<ol style="list-style-type: none">1. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore, (2004).2. Prescott, M.J., Harley, J.P. and Klein, D.A. Microbiology. 10th Edition WCB McGraw Hill, New York, (2002).3. Black J.G. Microbiology- Principles and Explorations. John Wiley & Sons Inc. New York, (2002).4. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill.5. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson6. Eugene W. Nester, Denise G. Anderson, C. Evans Roberts, Martha T. Nester. Microbiology, a Human Perspective, 6th Edition, Mc GRAW-HILL.			



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3	Mycology and Phycology				
4	Protozoology and Parasitology				

COURSE ARTICULATE MATRIX

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO1						
CO2						
CO3						
CO4						