

College of Basic Science and Humanities, OUAT, Bhubaneswar-3
Syllabus for +3,1st Year Science
MICROBIOLOGY (Core course), SEMESTER –I
Introduction to Microbiology and Microbial Diversity
(THEORY)
Course code- MBC (T) - 1101

Lesson plan

Unit	Topic	Lecture
1	<p>Historical Developments and Scope An overview of Scope of Microbiology for human welfare</p> <p>Development of microbiology as a discipline: Contribution of Anton von Leeuwenhoek, Louis Pasteur, Joseph Lister, Alexander Fleming, Robert Koch; Germ theory of disease,</p> <p>Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky</p> <p>Work of Paul Ehrlich and Elie Metchnikoff,</p>	<p>01</p> <p>04</p> <p>03</p> <p>02</p>
2	<p>Microbial Classification Systems of classification Binomial Nomenclature, Whittaker's five kingdom: Protista and Monera, Carl Woese's three kingdom classification systems and their utility.</p> <p>Difference between prokaryotic and eukaryotic microorganisms,</p> <p>General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions)</p> <p>Cellular microorganisms (Bacteria) with emphasis on distribution, economic importance.</p>	<p>04</p> <p>01</p> <p>03</p> <p>02</p>
3	<p>Algae and fungi General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction,</p> <p>Life cycles in micro algae with suitable examples: Haplobiontic, Haplontic, Diplontic, Diplobiontic and Diplohaplontic life cycles,</p> <p>General characteristics and Classification, nutritional types, fungal cell ultra- structure: thallus organization, reproduction,</p>	<p>04</p> <p>05</p> <p>03</p>

	Heterokaryosis, heterothallism and parasexual mechanism.	02
4	Protozoa Classification, General characteristics and significance with special reference to <i>Amoeba</i> , <i>Paramecium</i> , <i>Plasmodium</i> and <i>Giardia</i> .	08

Course breakup 2018-2019

+3 1st yr, 1st semester

Course Code: MBC (T) 1101 (Theory)

Course Title: INTRODUCTORY MICROBIOLOGY AND MICROBIAL DIVERSITY

Lecture No.	Topics covered.
1	Microbiology as a branch of science, An overview of Scope of Microbiology
2	An overview of Scope of Microbiology for human welfare
3	Development of microbiology as a discipline: Contribution of Anton von Leeuwenhoek
4	Contribution of Louis Pasteur , Joseph Lister
5	Contribution of Alexander Fleming
6	Contribution of Robert Koch; Germ theory of disease,
7	Development of the field of soil microbiology
8	Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky
9	Work of Paul Ehrlich and Elie Metchnikoff
10	Systems of classification Binomial Nomenclature, Whittaker's five kingdom: Protista and Monera.
11	Carl Woese's three kingdom classification systems and their utility.
12	Difference between prokaryotic and eukaryotic microorganisms.
13	Difference between prokaryotic and eukaryotic microorganisms
14	General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions)

15	General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions)
16	General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions)
17	General characteristics of different groups: Cellular microorganisms (bacteria)
18	General characteristics of different groups: Cellular microorganisms (bacteria)
19	Cellular microorganisms (Bacteria) with emphasis on distribution, economic importance.
20	Cellular microorganisms (Bacteria) with emphasis on distribution, economic importance
21	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples: Haplobiontic.
22	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples: Haplobiontic, Haplontic
23	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples:Haplontic
24	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples: Diplontic,
25	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples: Diplontic, Diplobiontic
26	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples:, Diplobiontic

27	General characteristics, Classification, ultra structure: thallus organization, Pigments reproduction, life cycles in micro algae with suitable examples: Diplohaplontic life cycles
28	General characteristics and Classification, nutritional types, fungal cell ultra-structure
29	General characteristics and Classification, nutritional types, fungal cell ultra-structure
30	Thallus organization
31	Reproduction
32	Reproduction
33	Heterokaryosis
34	Heterothallism
35	Parasexual mechanism
36	Introduction to protozoa.(Classification, General characteristics and significance)
37	Classification, General characteristics and significance with special reference to <i>Amoeba</i>
38	Classification, General characteristics and significance with special reference to <i>Amoeba, Paramecium</i>
39	Classification, General characteristics and significance with special reference to <i>Paramecium</i>
40	Classification, General characteristics and significance with special reference to <i>Plasmodium</i>
41	Classification, General characteristics and significance with special reference to <i>Plasmodium and Giardia</i>
42	Classification, General characteristics and significance with special reference to <i>Giardia</i>
43	Doubt clearing class
44	Class test
45	Class test

College of Basic Science and Humanities, OUAT, Bhubaneswar-3
Syllabus for +3,1st Year Science
MICROBIOLOGY (core course), SEMESTER –I
Bacteriology (THEORY)
Course code- MBC (T) - 1102

Lesson plan

Unit	Topic	Lecture
1	<p>Cell organization Cell size, shape and arrangement, capsule, cilia, flagella and motility, fimbriae and pili Cytoplasm: Ribosomes, mesosomes, inclusion bodies, nucleoid, chromosome and plasmids Endospore: Structure, formation, stages of sporulation Cell-wall: Composition and detailed structure of Gram-positive and Gram-negative bacteria Achaea: Archaeobacterial cell wall, lipopolysaccharide (LPS), sphaeroplasts, protoplasts, and L-forms.</p>	02 02 01 02 03
2	<p>Bacteriological techniques Pure culture isolation: Streaking, serial dilution and plating methods (spread plate and pour plate) Maintenance and preservation/stocking of pure cultures, cultivation of anaerobic bacteria Microscopy: Bright Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Scanning and Transmission Electron Microscope Bacterial staining: Gram and acid fast staining, Negative-staining.</p>	02 02 04 02
3	<p>Bacterial growth, reproduction and control Nutritional requirements in bacteria and nutritional types; Culture media: natural media, synthetic media, complex media, selective and differential media, enriched and enrichment media Phases of growth, logarithmic representation of bacterial populations, calculation of generation time and specific growth rate. Reproduction in bacteria: Asexual methods of reproduction, Parasexual reproduction (conjugation and transduction) Physical methods of microbial control: high and low temperature, filtration, desiccation, osmotic pressure, radiation Chemical methods of microbial control: disinfectants, types and mode of action.</p>	03 02 02 03 02
4	<p>Bacterial Systematics</p>	03

	Aim and principles of classification, systematics and taxonomy, concept of species, taxa, strain; conventional, molecular and recent approaches for bacterial taxonomy	03
	Phylogenetic classification, rRNA oligonucleotide sequencing and protein sequences.	01
	Differences between eubacteria and archaebacteria	03
	Important archaeal and eubacterial groups and their characteristics and significance: Thermophiles, Methanogens, Halophiles	02
	Chemoautotrophic bacteria, Photosynthetic bacteria (Cyanobacteria), Mycoplasma.	

COURSE BREAKUP

+3 1st year 1st semester **2018 - 2019**

Course Code: MBC (T) - 1102

Title: Bacteriology (Theory)

Lecture No.	Topics covered.	Date.	Signature.
1	Cell size, shape and arrangement, capsule		
2	Cilia, flagella and motility, fimbriae and pili		
3	Cytoplasm: Ribosomes, mesosomes, inclusion bodies, nucleoid		
4	Chromosome and plasmids		
5	Endospore: Structure, formation, stages of sporulation		
6	Cell-wall: Composition		
7	Cell-wall: Composition and detailed structure of Gram-positive		
8	Cell-wall: Composition and detailed structure of Gram-negative bacteria		
9	Cell-wall: Composition and detailed structure of Gram-negative bacteria		

10	Archaea: Archaeobacterial cell wall, lipopolysaccharide		
11	sphaeroplasts, protoplasts, and L-forms		
12	Pure culture isolation: Streaking.		
13	Serial dilution and plating methods (spread plate and pour plate).		
14	Maintenance and preservation/stocking of pure cultures.		
15	Cultivation of anaerobic bacteria		
16	Microscopy: Bright Field Microscope		
17	Bright Field Microscope		
18	Phase Contrast Microscope , Fluorescence Microscope		
19	Scanning and Transmission Electron Microscope,		
20	Scanning and Transmission Electron Microscope,		
21	Bacterial staining: Gram and acid fast staining		
22	Bacterial staining: Negative-staining.		
23	Nutritional requirements in bacteria and nutritional types		
24	Culture media: natural media, synthetic media, complex media.		
25	Culture media: Selective and differential media, enriched and enrichment media		
26	Bacterial growth, phases of growth, logarithmic representation of bacterial populations		
27	Calculation of generation time and specific growth rate		
28	Reproduction in bacteria: Asexual methods of reproduction		

29	Parasexual reproduction (conjugation and transduction)		
30	Physical methods of microbial control: high and low temperature, filtration		
31	Physical methods of microbial control: desiccation, osmotic pressure, radiation		
32	Chemical methods of microbial control: disinfectants, types and mode of action		
33	Chemical methods of microbial control: disinfectants, types and mode of action		
34	Aim and principles of classification, systematics and taxonomy, concept of species, taxa, strain		
35	Aim and principles of classification, systematics and taxonomy, concept of species, taxa, strain		
36	Conventional, molecular and recent approaches for bacterial taxonomy		
37	Phylogenetic classification		
38	rRNA oligonucleotide sequencing and protein sequences		
39	rRNA oligonucleotide sequencing and protein sequences		
40	Differences between eubacteria and archaeobacteria		
41	Important archaeal and eubacterial groups and their characteristics and significance: Thermophiles		
42	Characteristics and significance: Methanogens		
43	Characteristics and significance: Halophiles		
44	Characteristics and significance: Chemoautotrophic bacteria		

45	Characteristics and significance: Photosynthetic bacteria (Cyanobacteria),		
46	Characteristics and significance: Mycoplasma.		
47	Doubt clearing class		
48	Class test		

College of Basic Science and Humanities, OUAT, Bhubaneswar-3
Syllabus for +3, 1st Year Science
MICROBIOLOGY (GENERIC), SEMESTER –I
INTRODUCTION AND SCOPE OF MICROBIOLOGY (THEORY-I),
Code: MBG (T)-1101

Lesson plan

Unit	Topic	Lecture
1	Unit I History and Development of Microbiology Scope of Microbiology, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Joseph Lister, Alexander Fleming, Robert Koch, Germ theory of disease Development of various microbiological techniques, Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A. Waksman Contribution of Paul Ehrlich, Elie Metchnikoff and Edward Jenner	04 01 03
2	Unit II Diversity of Microorganisms Microorganism's position in Whittaker's five kingdom and Carl Woese's three kingdom classification systems General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya : Algae, Fungi and Protozoa) Definitions and citing examples of Protozoa ; Methods of nutrition, locomotion & reproduction - Amoeba, and <i>Plasmodium</i>	02 02 02 02
3	Unit III Instrumentation Bright Field Microscope, Principles and application Electron Microscope (TEM and SEM), Phase contrast microscope, Fluorescence microscope Sterilization process: Autoclave, Tyndallization, Hot Air Oven, Filtration.	05 03

4	Unit IV Bacteriological techniques	
	Culture media: natural media, synthetic media, complex media, selective and differential media, enriched and enrichment media	03
	Pure culture isolation: Streaking, serial dilution and plating methods (spread plate and pour plate); maintenance and preservation/stocking of pure cultures;	03
	Nutritional requirements in bacteria and nutritional types	01
	Bacterial staining: Gram and acid fast staining, Negative-staining	03
	Physical methods of microbial control: high and low temperature, filtration, desiccation, osmotic pressure, radiation	03
	Chemical methods of microbial control: disinfectants, types and mode of action	03

Course breakup 2018-2019

+3 1st yr, 1st semester

Course Code: MBG (T)-1101

Title: INTRODUCTION AND SCOPE OF MICROBIOLOGY (THEORY-I)

Lecture	Topics To Be Covered	Date	Signature
1	Scope of Microbiology		
2	Contributions of Anton von Leeuwenhoek, Louis Pasteur,		
3	Joseph Lister, Alexander Fleming		
4	Robert Koch, Germ theory of disease		
5	Development of various microbiological techniques		
6	Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky,		
7	Selman A. Waksman Contribution of Paul Ehrlich,		
8	Elie Metchnikoff and Edward Jenner		

9	Microorganism's position in Whittaker's five kingdom		
10	Carl Woese's three kingdom classification systems		
11	General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions)		
12	General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions)		
13	Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya : Algae, Fungi and Protozoa)		
14	Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya : Algae, Fungi and Protozoa)		
15	Definitions and citing examples of Protozoa		
16	Methods of nutrition, locomotion & reproduction - Amoeba, and <i>Plasmodium</i>		
17	Bright Field Microscope		
18	Principles and application Electron Microscope (TEM and SEM)		
19	Principles and application Electron Microscope (TEM and SEM)		
20	Phase contrast microscope		
21	Flourescence microscope		
22	Sterilization process: Autoclave, Tyndallization		
23	Hot Air Oven,		
24	Filtration.		
25	Culture media: natural media, and		
26	Synthetic media, complex media, selective		
27	Differential media, enriched and enrichment media		
28	Pure culture isolation: Streaking, serial dilution and		
29	Plating methods (spread plate and pour plate);		

30	Maintenance and preservation/stocking of pure cultures;		
31	Nutritional requirements in bacteria and nutritional types		
32	Bacterial staining: Gram and		
33	Acid fast staining,		
34	Negative-staining		
35	Physical methods of microbial control: high and low temperature,		
36	Filtration, desiccation,		
37	Osmotic pressure, radiation		
38	Chemical methods of microbial control:		
39	Disinfectants,		
40	Types and mode of action		