Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - B. Sc. Year I Sem I Microbiology (July 2016 -Dec 2016)

Micro+Chem+LS, Micro+Chem+Pharma

Subject - General Microbiology

Teacher - Fatema Matkawala

Day/Lecture	Unit	Topic
1	Unit 1	Introduction to microbiology
2		Antony von leeuwenhoek
3		Robert Koch, Edwerd Jenner
4		Louis Pasteur
5		Alexander Flemming, Joseph Lister
6		Theory of biogenesis and abiogenesis
7		Banches of microbiology
8		Applications of microbiology in human welfare
9		Differences between prokaryotic and eukaryotic microorganisms
10	Unit 2	Classification of microorganisms
11		Classification of microorganisms
12		Morphology and types of bacteria
13		Ultra structure of Eubacteria
14		Cell wall of bacteria
15		Cell Membrane- structure and function
16		Capsule- Composition and function
17		Structure and Function of Flagella
18		Structure and Function of Pilli
19		Spheroplast, Protoplast, Prostheceae, Stalk, Gas vacuoles
20		Sheath, Glycocalyx, Internal membrane system, Mesosomes
21		Chromosomes, Nucleoid, Ribosomes, Cytoplasmic inclusions
22		Spores- endospores, exospores, Cysts,
23		General principles of bacterial nomenclature
24		Introduction to Bergey's Manual
25	Unit 3	Introduction to fungi and classification
26		Fungi and its economic importance
27		Introduction and importance of algae
28		Introduction and importance of protozoa
29		Introduction and classification of phage
30		Morphology and structure of phages
31		Phage- nucleic acid, host,
32		Reproduction- lytic and lysogenic cycles
33		Reproduction- lytic and lysogenic cycles
34		T4, TMV, Pox virus, Prions, Virions, Virusoid, Viriod

35		Cyanobacteria, Actinomycetes, Mycoplasma
36		Rickettsia, Chlamydia, Archaebacteria
37	Unit 4	Microscopy - Principles, working and applications
38		Bright field microscopy
39		Dark field microscopy
40		Fluorescence microscopy
41		Electron microscopy
42		Stains, types of stains and staining techniques
43		Staining methods- Monochrome, Gram's, Endospore
44		Staining methods- Capsule, Flagella, Negetive
45		Staining methods- Metachromatic, acid fast
46		Wet mount and hanging drop method
47	Unit 5	Sterilization, Disinfection, Antiseptic, Sanitization
48		Bactericidal, bacteriostatic
49		Control of microorganisms- Basics, Physical agents of control
50		Physical agents of control- temperature, radiations
51		Physical agents of control - dessication, osmotic pressure, filteration
52		Chemical agents of control- phenol, alcohol, halogens
53		Chemical agents of control- heavy metals, detergents
54		Chemical agents of control- quaternary ammonium compounds, gaseous sterilizers

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Department of Biosciences	
Lesson Plan - B. Sc. Year I Sem I Microbiology (July 2016 -Dec 2016)	
Micro+Chem+LS, Micro+Chem+Pharma	
Subject - General Microbiology	
Teacher - Fatema Matkawala	
Day/Lecture	**Topic**
1	Principles, working knowledge of instruments like Autoclave, Hot-air oven, Incubator, Refrigerator, Laminar Air Flow, Microscope, Colony counter, Centrifuge, Colorimeter
2	Principles, working knowledge of instruments like Autoclave, Hot-air oven, Incubator, Refrigerator, Laminar Air Flow, Microscope, Colony counter, Centrifuge, Colorimeter
3	Neutralization, cleaning and sterilization of glasswares
4	Neutralization, cleaning and sterilization of glasswares
5	Measurement of Microorganisms
6	Preparation of stains
7	Preparation of stains
8	Staning techniques- Monochrome staining
9	Negative staining
10	Gram staining
11	Cell wall staining
12	Capsule staining
13	Metachromatic granule staining
14	Endospore staining
15	Identification of some common fungi
16	Identification of some common fungi

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - B. Sc. Year I Sem II Microbiology (Jan 2017 -June 2017)

Micro+Chem+LS, Micro+Chem+Pharma

Subject - Microbial Physiology and Biochemistry

Teacher - Fatema Matkawala

Day/Lecture	Unit	Topic
1	1	Introduction to cultivation and preservation of bacteria
2		Nutritional types of bacteria
3		Nutritional types of bacteria
4		Bacteriological media and its type
5		Bacteriological media and its type
6		Cultivation of aerobic microbes
7		Cultivation of anaerobic microbes
8		Pure culture and cultural characteristics
9		Pure culture and cultural characteristics
10		Maintenance and preservation of cultures
11		Maintenance and preservation of cultures
12	2	Introduction to bacterial growth
13		Growth curve of bacteria
14		Batch Culture
15		Continous culture
16		Synchronous culture and diauxic growth
17		Factors affecting microbial growth
18		Factors affecting microbial growth
19		Growth of microbes in extreme environments
20		Growth of microbes in extreme environments
21		Quantitative measurements of bacterial growth by cell mass
22		Quantitative measurements of bacterial growth by cell number
23		Quantitative measurements of bacterial growth by cell activity
24	3	General chartacters of enzymes
25		Classification of enzymes
26		Nomenclature of enzymes
27		Factors affecting enzymatic activity
28		Mechanism of enzyme action
29		Mechanism of enzyme action
30		Regulation of enzyme activity
31		Feedback inhibition, Precursor activation
32		Energy link control
33		Application of enzymes
34		Application of enzymes
35	4	Carbohydrates - General properties
36		Carbohydrates - Classification
37		Carbohydrates - Functions
38		Lipids - General properties and classification
39		Lipids - Functions
40		Amino Acids - General properties and classification
41		Amino Acids - Functions
42		Proteins - General properties

43		Proteins - Classification
44		Proteins - Functions
45	5	Introduction to microbial metabolism
46		Energy production by aerobic process
47		Energy production by anaerobic process
48		Bacterial photosynthesis
49		Bacterial photosynthesis
50		Metabolism of protein - proteolysis
51		Metabolism of protein - transamination
52		Metabolism of protein - deamination
53		Metabolism of lipids - alpha oxidation
54		Metabolism of lipids - beta oxidation
55		Metabolism of lipids - beta oxidation

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - B. Sc. Year I Sem II Microbiology (Jan 2017 -June 2017)

Micro+Chem+LS, Micro+Chem+Pharma

Subject - Microbial Physiology and Biochemistry (Practicals)

Teacher - Fatema Matkawala

Day/Lecture	Topic
1	Preparation of culture media like Nutrient Agar and its uses
2	Preparation of culture media like Nutrient Agar and its uses
3	Growth of microorganisms on Agar slants, Stabs and in broths
4	Growth of microorganisms on Agar slants, Stabs and in broths
5	Isolation of microorganisms by streak plate method
6	Isolation of microorganisms by pour plate method
7	Qualitative detection of Carbohydrates
8	Qualitative detection of Proteins
9	Qualitative detection of Lipids
10	Effect of environment on bacterial growth- Temperature
11	Effect of environment on bacterial growth- pH
12	The oligodynamic action of heavy metals on bacterial growth
13	The oligodynamic action of heavy metals on bacterial growth
14	Demonstration of extracellular enzyme production by microbes
15	Demonstration of extracellular enzyme production by microbes
16	Effect of pH on enzyme activity
17	Effect of pH on enzyme activity
18	Effect of temperature on enzyme activity
19	Effect of temperature on enzyme activity
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Maharaja Ranjit Singh College of Professional Sciences, Indore		
Department of Biosciences		
Lesson Plan - B. Sc. Year II Sem III Microbiology (July 2016 - Dec 2016)		
Micro+Chem+LS, Micro+Chem+Pharma		
Subject - Bacterial Genetics		
Teacher - Fatema Matkawala		
Day/Lecture	**Unit**	**Topic**
1	Unit 1	Genotype and Phenotype
2		DNA as a genetic material
3		DNA as a genetic material
4		Structure of DNA
5		Structure of DNA
6		Type of DNA
7		Structure and types of RNA
8		Structure and types of RNA
9		Genetic code
10		Genetic code
11		DNA Replication
12		DNA Replication
13		DNA Replication
14	Unit 2	Mutations- Introduction
15		Spontaneuos
16		Induced
17		Molecular basis of mutation
18		Types of mutations
19		Types of mutations
20		Types of bacterial mutants and their isolation
21		Types of bacterial mutants and their isolation
22		Physical mutagenic agents
23		Chemical mutagenic agents
24		Chemical mutagenic agents
25	Unit 3	Transformation
26		Transformation
27		Conjugation
28		Conjugation - F factor, donor, recipient
29		Formation of Hfr, F prime cells
30		Sexduction
31		Transduction
32		General and specialised
33		Abortive transduction
34		Types and functions of transposons and plasmids

35		Types and functions of transposons and plasmids
36	Unit 4	Central dogma of molecular biology
37		Transcription
38		Transcription
39		Transcription
40		Translation
41		Translation
42		Operon concept
43		Lac operon
44		Trp operon
45	Unit 5	Genetic engineering - Basics
46		Restriction enzymes
47		Types of restriction enzymes
48		Isolation of DNA
49		Vectors - plasmids
50		Cosmids, yeast vectors
51		Cloning and identification of clones
52		Cloning and identification of clones
53		Achievements, biohazards and ethics in genetic engineering

Maharaja Ranjit Singh College of Professional Sciences, Indore	
Department of Biosciences	
Lesson Plan - B. Sc. Year II Sem III Microbiology (July 2016 - Dec 2016)	
Micro+Chem+LS, Micro+Chem+Pharma	
Subject - Bacterial Genetics (Practicals)	
Teacher - Fatema Matkawala	
Day/Lecture	**Topic**
1	Isolation of bacterial genomic DNA
2	Isolation of bacterial genomic DNA
3	Isolation of Plasmid DNA
4	Isolation of Plasmid DNA
5	Electrophoretic analysis of DNA
6	U.V. as a mutagenic agent
7	U.V. as a mutagenic agent
8	Replica plating technique
9	Replica plating technique
10	Isolation of antibiotic resistant mutants by Gradient Plate technique
11	Isolation of antibiotic resistant mutants by Gradient Plate technique
12	Quantitative estimation of DNA by DPA method
13	Quantitative estimation of RNA by Orcinol method
14	Spectrophotometric analysis of DNA (Demonstration)

Maharaja Ranjit Singh College of Professional Sciences, Indore		
Department of Biosciences		
Lesson Plan - B. Sc. Year II Microbiology Sem IV (Jan 2017 - June 2017)		
Micro+Chem+LS, Micro+Chem+Pharma		
Subject - Immunology and Clinical Microbiology		
Teacher - Zahabiya Saifee		
Day/Lecture	**Unit**	**Topic**
1	I	Normal Flora of human body
2		Infection and its types
3		Mechanism of pathogenesis
4		Natural Immunity
5		Acquired Immunity
6		First line of defence
7		Second and Third line of defence
8		Vaccines
9		Types of vaccine
10		Modern Vaccination
11		Schedule for vaccination of children in india
12	II	Transmission of disease
13		Types of disease - Epidemic, Endemic
14		Types of disease - Pandemic, Sporadic
15		Epidemiological Methods - Descriptive and Analytical
16		Epidemiological Methods - Experimental
17		Antibiotics - Mode of action
18		Development of resistance
19		Antiviral drugs
20		Antifungal drugs
21	III	Organs in immune response
22		Cells in immune response
23		Antigens - Properties and types
24		Adjuvants
25		Immunoglobulins - Structure
26		Immunoglobulins - Types
27		Primary Immune response
28		Secondary Immune response
29		Complement Componenets

30		Complement Biological activities
31	IV	Antigen and antibody reaction
32		Agglutination
33		Precipitation
34		Immunofloresecence
35		ELISA
36		RIA
37		Hypersensitivity - Immediate
38		Hypersensitivity - Delayed
39		Autoimmune diseases
40		Autoimmune diseases
41	V	Gram Positive cocci - Staphylococcus aureus
42		Gram negative bacilli - Salmonella typhi
43		Acid fast bacteria - Mycobacterium tuberculosis
44		Anaerobic, Gram positive bacilli - Clostridium tetani
45		Spirochate - Treponema pallidium
46		Virus - Hepatitis and HIV

Maharaja Ranjit Singh College of Professional Sciences, Indore	
Department of Biosciences	
Lesson Plan - B. Sc. Year II Microbiology Sem IV (Jan 2017 - June 2017)	
Micro+Chem+LS, Micro+Chem+Pharma	
Subject - Immunology and Clinical Microbiology (Practicals)	
Teacher - Zahabiya Saifee	
Day/Lecture	**Topic**
1	Determination of Blood groups
2	Estimation of Hemoglobin by Sahli's method
3	Estimation of Hemoglobin by Sahli's method
4	Total count of W.B.C
5	Total count of R.B.C
6	Differential W.B.C. count
7	Flocculation reaction- VDRL
8	Agglutination reaction- Widal test
9	Examination of Urine- Chemical, physical ,microscopic and bacteriological
10	Examination of Urine- Chemical, physical ,microscopic and bacteriological
11	Isolation and identification of medically important bacteria- Staphylococcus aureus
12	Isolation and identification of medically important bacteria- Staphylococcus aureus
13	Isolation and identification of medically important bacteria- E.coli
14	Isolation and identification of medically important bacteria- E.coli
15	Isolation and identification of medically important bacteria- Proteus sp.
16	Isolation and identification of medically important bacteria- Proteus sp.
17	Isolation and identification of medically important bacteria- Salmonella typhi
18	Isolation and identification of medically important bacteria- Salmonella typhi

Maharaja Ranjit Singh College of Professional Sciences, Indo

Department of Biosciences

esson Plan - B. Sc. Year III Sem V Microbiology (July 2016 - Dec 201

Micro+Chem+LS, Micro+Chem+Pharma

Subject - Industrial Microbiology

Teacher - Fatema Matkawala

Day/Lecture	Unit	Topic
1	Unit 1	Isolation and screening microorganisms
2		Primary screening methods
3		Secondary screening methods
4		Secondary screening methods
5		Strain improvement
6		Media formulation
7		Media formulation
8		Scale-up
9		Inoculum development
10		Harvesting and product recovery
11		Harvesting and product recovery
12		Harvesting and product recovery
13		Harvesting and product recovery
14	Unit 2	Industrial sterilization
15		Basic fermentor design
16		Factors affecting fermenter design
17		Batch, Fed-batch, Continuous process
18		Types of fermenters
19		Types of fermenters
20		Solid state fermentation
21		Surface fermentation
22		Submerged fermentation
23		Measurements and control of bioprocess parameters
24		Measurements and control of bioprocess parameters
25	Unit 3	Bioassay of Vitamins
26		Bioassay of Vitamins
27		Bioassay of Antibiotics
28		Bioassay of Antibiotics
29		Phenol Coefficient Method
30		Sterility test
31		Sterility test
32		Microbial Limit Test
33		Microbial Limit Test
34		LAL test for pyrogen testing
35		Minimum Inhibitory Concentration
36	Unit 4	Industrial production of Ethanol
37		Industrial production of Lysine
38		Industrial production of Penicillin
39		Industrial production of Penicillin
40		Industrial production of Citric acid
41		Industrial production of Vitamin B12

42		Protease- production and purification
43		Bioinsecticides -bacterial, fungal, viral
44	Unit 5	Bioinsecticides -bacterial, fungal, viral
45		Biofertilisers- symbiotic
46		Biofertilisers - nonsymbiotic
47		Biofertilisers -phosphate solubilizer, mycorrhiza
48		Biofuel
49		Biogas production
50		Enzyme immobilisation
51		Enzyme immobilisation
52		Whole cell immobilisation
53		Applications of immobilization

Maharaja Ranjit Singh College of Professional Sciences, Indore Department of Biosciences Lesson Plan - B. Sc. Year III Sem V Microbiology (July 2016 - Dec 2016)	
Micro+Chem+LS, Micro+Chem+Pharma	
Subject - Industrial Microbiology (Practicals) **Teacher - Fatema Matkawala**	
Day/Lecture	**Topic**
1	Screening of antibiotic producing microorganisms
2	Screening of antibiotic producing microorganisms
3	Primary screening of Amylase producing microorganisms
4	Primary screening of Amylase producing microorganisms
5	Primary screening of Protease producing microorganisms
6	Primary screening of Protease producing microorganisms
7	Primary screening of Cellulase producing microorganisms
8	Primary screening of Cellulase producing microorganisms
9	Primary screening of Lipase producing microorganisms
10	Primary screening of Lipase producing microorganisms
11	Microbial assay of antibiotics
12	Microbial assay of antibiotics
13	Estimation of MIC for antibiotics
14	Estimation of MIC for antibiotics
15	Sterility testing of pharmaceutical products- injectables, eye drops and ear drops
16	Sterility testing of pharmaceutical products- injectables, eye drops and ear drops
17	Microbial Limit test- Tablets and Syrups
18	Microbial Limit test- Tablets and Syrups
19	Area monitoring
20	Area monitoring

Maharaja Ranjit Singh College of Professional Sciences

Department of Biosciences

Lesson Plan - B. Sc. Year III Sem VI Microbiology (Jan 2017 - June 2017)

Subject - Applied and Enviornmental Microbiology

Teacher - Dr. Mukesh K Patidar

Day/Lecture	Unit	Topic
1	1	Soil Microbiology - Introduction
2		Physical characteristics of soil
3		Chemical characteristic of soil
4		Estimation of soil microflora
5		Estimation of soil microflora
6		Estimation of soil microflora
7		Interaction among soil microflora
8		Interaction among soil microflora
9		Nitrogen cycle
10		Carbon cycle
11		Sulfur cycle
12	2	Introduction to food microbiology
13		Microbiological examination of food and milk
14		Food and milk borne disease
15		Food and milk borne disease
16		Food intoxication
17		Spoilage of food - fresh food, canned food
18		Spoilage of food - vegetable and milk products
19		Grading of milk - MBRT
20		Resazurin and phosphatase test
21		Preservation of food
22		Dairy products - Cheese, Butter and Yogurt
23		Microorganism as a food - SCP
24	3	Waste water microbiology introduction
25		Microbiological examination of water
26		Microbiological examination of waste water
27		Microbiological examination of waste water
28		Water borne diseases
29		Water borne diseases
30		Water purification
31		Primary Treatment of waste water
32		Secondary Treatment of waste water
33		Tertiary Treatment of waste water
34		Solid processing

35		Eutrophication
36	4	Air microbiology introduction
37		Air borne disease
38		Air borne disease
39		Microbiological analysis of water
40		Microbiological analysis of water
41		Aeromicroflora of different habitats
42		Aeromicroflora of different habitats
43		Aeroallergens
44		Control of microorganism in air
45	5	Applications of microorganism
46		Microbial leaching of copper and uranium
47		Microbial leaching of copper and uranium
48		MEOR - biorecovery of petroleum
49		Bioremidiation
50		Biodeterioration - petroleum products, leather
51		Biodeterioration - textile and paper
52		Application of biosensors
53		Application of biosensors
54		Application of biopolymers
55		Application of biopolymers

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Department of Biosciences

Lesson Plan - B. Sc. Year III Sem VI Microbiology (Jan 2017 - June 2017)

Micro+Chem+LS, Micro+Chem+Pharma

Subject - Applied and Enviornmental Microbiology (Practicals)

Teacher - Dr. Mukesh K Patidar

Day/Lecture	Topic
1	Qualitative and quantitative examination of food
2	Qualitative and quantitative examination of milk
3	Qualitative and quantitative examination of water
4	Qualitative and quantitative examination of sewage
5	Estimation of soil microflora (bacteria, yeast and mould)
6	Estimation of soil microflora (bacteria, yeast and mould)
7	Isolation of Azotobacter
8	Isolation of Azotobacter
9	Isolation of Rhizobium from root nodules
10	Isolation of phosphate solubilizing microorganisms
11	Isolation of phosphate solubilizing microorganisms
12	Estimation of air microflora
13	Estimation of air microflora
14	Isolation of Lactobacillus
15	Isolation of Lactobacillus
16	Isolation of Yeast
17	Isolation of Yeast