

Maharaja Ranjit Singh College of Professional Sciences, Indore		
Department of Biosciences		
Lesson Plan - B. Sc. Year I Microbiology (July 2017 - June 2018)		
Micro+Chem+LS, Micro+Chem+Pharma		
Paper I - General Microbiology and Cell Biology		
Teacher - Fatema Matkawala, Zahabiya Saifee		
Day/Lecture	Unit	Topic
1	Unit 1	Introduction to microbiology
2		Contributions made by eminent scientists
3		Contributions made by eminent scientists
4		Contributions made by eminent scientists
5		Contributions made by eminent scientists
6		Scope and development of microbiology
7		Banches of microbiology
8		Concept of diseases
9		Applications of microbiology in human welfare
10	Unit 2	Classification of microorganisms
11		Classification of microorganisms
12		Morphology and types of bacteria
13		Ultra structure of Eubacteria and Archaeobacteria
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 Pili
19		Spheroplast, Protoplast, Prosthecae, Stalk, Gas vacuoles
20		Sheath, Glycocalyx, Internal membrane system, Mesosomes
21		Chromosomes, Nucleoid, Ribosomes, Cytoplasmic inclusions
22		Spores- endospores, exospores, Cysts,
23		Cyanobacteria, Actinomycetes, Mycoplasma
24		Rickettsia, Chlamydia
25	Unit 3	Introduction to fungi and classification
26		General characteristics, thallus, mycelia
27		Nutrition, Heterokaryosis
28		Structure and function of parts of fungi
29		Reproduction- sexual and asexual
30		Economic importance of fungi
31		Introduction and classification of phage
32		Morphology and structure of phages
33		Phage- nucleic acid, host,
34		Reproduction- lytic and lysogenic cycles
35		Reproduction- lytic and lysogenic cycles

36		DNA and RNA virus
37		T4, TMV, Pox virus, Prions, Virions, Virusoid, Viriod
38	Unit 4	Structure and organisation and function of cell organelles
39		Structure and organisation and function of cell organelles
40		Structure and organisation and function of cell organelles
41		Structure and organisation and function of cell organelles
42		Cell cycle
43		Cell division
44		Membrane structure and intercellular transport
45		Cellular interaction and locomotion
46		Cell differentiation
47		Cell senescence
48	Unit 5	Isolation of microorganisms
49		Pure, axenic, mixed culture, strain, isolate, clone
50		Pure culture techniques- spread plate, pour plate, streak plate methods
51		Serial dilution, Enrichment culture technique
52		Micromanipulator
53		Maintainance and preservation of pure cultures
54		Maintainance and preservation of pure cultures
55		Maintainance and preservation of pure cultures
56		Maintainance and preservation of pure cultures
57		Major culture collection centres of India

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Paper II- Tools and Techniques in Microbiology		
Teacher -Dr. Mukesh K Patidar		
Day/Lecture	Unit	Topic
1	Unit 1	Microscopy- Introduction
2		Light Microscopy
3		Phase Contrast Microscopy
4		Flourescence Microscopy
5		Electron Microscopy -SEM
6		Electron Microscopy -TEM
7		Preparation of specimen
8		Limitation and application of Microscopy
9		Use of Software in Microscopy
10		Unit 2
11	Oven - Principle and application	
12	BOD Incubator -Principle and applications	
13	LAF- Principle	
14	Colorimeter	
15	Spectrophotometer	
16	Centrifugation	
17	Principle of Sedimentation	
18	Chromatography -Introduction	
19	Types of chromatography	
20	Unit 4	Applications of chromatography
21		Ocular and stage micrometry
22		Cell count and haemocytometry
23		Useof camera lucida
24		Stain and staining techniques
25		Chemistry of dye and stains
26		Monochrome and Negative staining
27		Differentialstaining -Gram's Staining
28		Acid fast staining
29		Cell wall staining, metachromatic granules staining
30	Unit 5	Capsule staining
31		Typesof media and preparation of medium
32		Characteristics of growth medium
33		Control of microorganisms -Physical methods
34		Control of microorganisms -Physical methods
35	Control of microorganisms -Physical methods	

36	Control of microorganisms -Chemical methods
37	Control of microorganisms -Chemical methods
38	Control of microorganisms -Chemical methods

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Practicals	
Teacher - Fatema Matkawala	
Day/Lecture	Topic
1	Demonstration and briefing about principles and working of basic instruments, autoclave, incubator, hot-air oven, Laminar air flow
2	Demonstration and briefing about principles and working of pH meter, Spectrophotometer and Centrifuge
3	Basic media preparation, autoclaving, cleaning and sterilization of glass wares
4	Basic media preparation, autoclaving, cleaning and sterilization of glass wares
5	Media preparation: Liquid media-Peptone water, Nutrient Broth, Solid media-Nutrient agar (Agar slant, Agar plate)
6	Media preparation: Enriched medium- Blood agar, Differential medium-Mac Conkey agar
7	Media preparation: Enrichment medium-Selenite F broth, Selective medium-EMB
8	Culture characteristics of Microorganisms on different media
9	Culture characteristics of Microorganisms on different media
10	Culture characteristics of Microorganisms on different media
11	Demonstration of Selective and Differential media
12	Demonstration of Selective and Differential media
13	Isolation of bacteria from water by serial dilution agar plating method
14	Isolation of bacteria from water by serial dilution agar plating method
15	Isolation of bacteria from soil by serial dilution agar plating method
16	Isolation of bacteria from soil by serial dilution agar plating method
17	Isolation of fungi from water by serial dilution agar plating method
18	Isolation of fungi from water by serial dilution agar plating method
19	Isolation of fungi from soil by serial dilution agar plating method
20	Isolation of fungi from soil by serial dilution agar plating method
21	Estimation of air microflora
22	Estimation of air microflora
23	Isolation of bacteria by Pour-plate method
24	Isolation of bacteria by Pour-plate method
25	Isolation of bacteria by Streak-plate method
26	Isolation of bacteria by Streak-plate method
27	Isolation of bacteria by Spread-plate method
28	Isolation of bacteria by Spread-plate method
29	Preparation of smear and microscopic examination of Fungi- <i>Mucor</i> sp, <i>Aspergillus</i> sp.
30	Preparation of smear and microscopic examination of Fungi- <i>Penicillium</i> sp. and <i>Alternaria</i> sp.
31	Preparation of smear and microscopic examination of Bacteria- <i>Staphylococcus</i> sp, <i>Lactobacillus</i> sp.
32	Preparation of smear and microscopic examination of Bacteria- <i>Escherichia</i> sp., <i>Vibrio</i> sp. and <i>Leptospira</i> sp.
33	Staining techniques- Simple staining, Differential staining (Gram's, Ziehl-Neelson)
34	Staining techniques-Spore and Capsular staining methods

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Lesson Plan - B. Sc. Ye

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Teacher - Fat

Day/Lecture	Unit
1	Unit 1
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14	Unit 2
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36	Unit 4
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45	Unit 5
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High College of Professional Sciences, Indore

Department of Biosciences

Year II Sem III Microbiology (July 2017 - Dec 2017)

Chem+LS, Micro+Chem+Pharma

Subject - Bacterial Genetics

Pratima Matkawala, Sakina Ratlamwala

Topic
Genotype and Phenotype
DNA as a genetic material
DNA as a genetic material
Structure of DNA
Structure of DNA
Type of DNA
Structure and types of RNA
Structure and types of RNA
Genetic code
Genetic code
DNA Replication
DNA Replication
DNA Replication
Mutations- Introduction
Spontaneous
Induced
Molecular basis of mutation
Types of mutations
Types of mutations
Types of bacterial mutants and their isolation
Types of bacterial mutants and their isolation
Physical mutagenic agents
Chemical mutagenic agents
Chemical mutagenic agents
Transformation
Transformation
Conjugation
Conjugation - F factor, donor, recipient
Formation of Hfr, F prime cells
Sexduction
Transduction
General and specialised

Abortive transduction
Types and functions of transposons and plasmids
Types and functions of transposons and plasmids
Central dogma of molecular biology
Transcription
Transcription
Transcription
Translation
Translation
Operon concept
Lac operon
Trp operon
Genetic engineering - Basics
Restriction enzymes
Types of restriction enzymes
Isolation of DNA
Vectors - plasmids
Cosmids, yeast vectors
Cloning and identification of clones
Cloning and identification of clones
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 2017 - Dec 2017)	
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

Department of Biosciences

Lesson Plan - B. Sc. Year II Microbiology Sem IV (Jan 2018 - June 2018)

Micro+Chem+LS, Micro+Chem+Pharma

Subject - Immunology and Clinical Microbiology

Teacher - Baishali Roy

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		Immunoflorescence
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 pallidum
46		Virus - Hepatitis and HIV

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Lesson Plan - B. Sc. Year II Microbiology Sem IV (Jan 2018 - June 2018)	
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

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Lesson Plan - B. Sc. Year III Sem V Microbiology (July 2017 - Dec 2017)		
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

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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

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Lesson Plan - B. Sc. Year III Sem VI Microbiology (Jan 2018 - June 2018)

Micro+Chem+LS, Micro+Chem+Pharma

Subject - Applied and Environmental Microbiology

Teacher - Sakina Ratlamwala

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		Air microbiology introduction
37		Air borne disease
38		Air borne disease
39		Microbiological analysis of water
40	4	Microbiological analysis of water
41		Aeromicroflora of different habitats
42		Aeromicroflora of different habitats
43		Aeroallergens
44		Control of microorganism in air
45		Applications of microorganism
46		Microbial leaching of copper and uranium
47		Microbial leaching of copper and uranium
48		MEOR - biorecovery of petroleum
49		Bioremediation
50	5	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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Lesson Plan - B. Sc. Year III Sem VI Microbiology (Jan 2018 - June 2018)	
Micro+Chem+LS, Micro+Chem+Pharma	
Subject - Applied and Environmental Microbiology	
Teacher -Zahabiya Saifee	
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