Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - M. Sc. I Microbiology (July 2019 -Dec 2019)

Subject - Bacteriology

Teacher - Dr. Sheetal Bhasin, Prof. Fatema Matkawala

Day/Lecture	Unit	Topic
1	Unit 1	Contributions made by eminent scientists
2		Contributions made by eminent scientists
3		Contributions made by eminent scientists
4		Contributions made by eminent scientists
5		Classification of microorganisms
6		Classification of microorganisms
7		Classification of microorganisms
8		Bergey's Manual of Determinative Bacteriology
9		Bergey's Manual of Systematic Bacteriology
10		Modern methods of classification
11		Modern methods of classification
12		Techniques for determining microbial taxonomy and phylogeny
13		Techniques for determining microbial taxonomy and phylogeny
14		Phylogenetic tree - construction and interpretation
15		Phylogenetic tree - construction and interpretation
16		Numerical Taxonomy
17		Numerical Taxonomy
18	Unit 2	Morphology of bacteria
19		Types of bacteria
20		Cell wall of Eubacteria
21		Cell wall of Eubacteria
22		Gram's Staining
23		Cell wall of Archaebacteria
24		Spheroplast, Protoplast
25		Capsule- Composition and function
26		Cell Membrane- structure
27		Cell Membrane- function
28		Cell Membrane- function
29	Unit 3	Structure and Function of Flagella
30		Structure and Function of Pilli
31		Gas vesicles, Carboxysomes
32		Chromosomes, Nucleoid
33		Magnetosomes, Phycobolisomes
34		Spores
35		Cysts
36		Reserve food materials- PHB, Polyphosphate granules
37		Oil droplets, Cyanophycin granules, Sulphur inclusions
38	Unit 4	Cultivation of aerobic bacteria
39		Cultivation of aerobic and anaerobic bacteria
40		Nutritional types of bacteria
41		Nutritional types of bacteria
42		Bacteriological media
43		Types of media
44		Types of media , Bacterial growth curve
45		Growth Kinetics, Generation time, Growth Rate
46		Batch, Continous, Synchronous , Diauxic growth
47		Measurements of microbial growth
48		Measurements of microbial growth
49		Factors affecting microbial growth
50		Factors affecting microbial growth
51	Unit 5	Microbial Death Curve
52		Bioburden, Thermal Death Constant, Decimal Reduction Time
53		Control of microorganisms- Basics, Physical agents of control
54		Physical agents of control
55		Physical agents of control
56		Chemical agents of control
57		Chemical agents of control
58		Chemical agents of control
59		Evaluation of anitimicrobials -Tube dilution, Agar diffusion
60		Phenol coefficient method

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Department of Biosciences

Lesson Plan - M. Sc. I (July 2019 -Dec2019)

Subject - Virology, Mycology and Phycology

Teacher - Dr. Mukesh Patidar

Day/Lecture	Unit	Topic
1	Unit 1	Discovery, nomenclature
2		General characters of viruses
3		Classification of virus
4		Baltimore, ICTV classification
5		Morphology and ultra structure
6		Capsids and their arrangements
7		Types of envelopes and their composition
8		Viral genome, their types and structures
9		Virus related agents-Viroids
10		Prions
11	Unit 2	Bacteriophages-Introduction
12		Organization and life cycle
13		One step growth curve
14		Lytic cycle, Lysogenic cycle
15		Bacteriophage typing
16		Application in bacterial genetics
17		Brief details on T phages and Lambda phages
18	Unit 3	Cultivation of viruses in embryonated eggs
19		experimental animals and cell cultures
20		Assay of viruses
21		Physical and chemical methods-Protein, nucleic acid
22		Radioactivity tracers, electron microscopy
23		Infectivity assay-Plaque method
24		End point method
25	Unit 4	General characters of fungi,
26		Structure and composition of fungal cells
27		Reproduction of fungi.
28		Classification of fungi
29		Economic significance of fungi
30		Symbiotic associations of fungi- mycorrhiza, lichens
31		Life cycle of Penicillium and Saccharomyces
32		Life cycle of Saccharomyces
33	Unit 5	General characters of algae
34		Algal cell structure
35		Nutrition, reproduction
36		Distribution of algae
37		Classification of algae
38		Salient features of green algae
39		Diatoms, euglenoids
40		Brown algae,
41		Red algae
42		Microalgae
42		Economic significance of algae

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Department of Biosciences

Lesson Plan - M. Sc. Microbiology Sem I (July 2019-Dec 2019)

Subject - Immunology

Teacher - Dr. Sheetal Bhasin, Zahabiya Saifee

Day/Lecture	Unit	Topic
1	I	Innate & aquired immunity
2		Structure & types of cells
3		Organs of immune system
4		Organs of immune system
5		Antigen processing & presentation
6		Humoral & cell mediated response
7		Structure & types of MHC
8		Modern methods of vaccine production
9	II	Structure & properties of antigens
10		Haptens & adjuvants
11		Immunoglobulins structure
12		Types properties of Ig
13		Antibody generation & diversity
14		Sructure & components of complements
15		Activation of complement system & functions
16		Complement pathways
17		Complement fixation
18	III	Basic of antigen antibody interaction
19		Agglutination
20		Precipitation
21		Immunofluorescence, ELISA
22		Radioimmunoassay, Immunoblotting
23		Skin test & applications
24		Hybridoma technology & applications
25	IV	Tranplantation immunology
26		Tissue transplantation
27		Types of grafts
28		Immunologic basis of graft rejection
29		Clinical aspects of graft rejection
30		HLA typing methods
31		organ & tissue transplantation
32		Tumor immunology
33		Cancer, origin & oncogenes
34		Tumor antigens, immune response to tumor
35		Tumor evasion of immune system
36		Immunodiagnosis of tumors
37		Blood group system
38		Medical importance of blood group
39		ABO & Rh incompatibility
40	V	Hypersensitivity Type I
41		Hypersensitivity Type II
42		Hypersensitivity Type III
43		Delayed hypersensitivity
44		Autoimmunity
45		Autoimmune diseases

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - M. Sc. I (July 2019 -Dec2020)

Subject - Microbiology, Paper-IV: Microbial Biochemistry

Teacher - Dr. Sadhna Nighojkar

Day/Lecture	Unit	Topic
1	I	Carbohydrates-definitions and classification of carbohydrates
2		Stereoisomerism and optical isomerism in sugars
3		Stereoisomerism and optical isomerism in sugars
4		Structure, properties and chemical reactions of monosaccharides
5		Structure, properties and chemical reactions of monosaccharides
6		Structure, properties and chemical reactions of disaccharides and Oligosaccharides
7		Structure, properties and chemical reactions of Polysaccharides
8		Structure, occurrence and biological importance of carbohydrate derivatives-
9		Peptidoglycan, blood groups and lipopolysaccharides
10	II	Definition and classification of lipids
11		Building blocks of lipids-fatty acids, glycerol
12		Fatty acids- distribution classification, Pcharacterization
13		Fatty acids- distribution in nature, classification, characterization
14		Fatty acids- distribution in nature, classification, characterization
15		Saponification and Iodine number
16		Phospholipids-Structure, properties and functions
17		Phospholipids-Structure, properties and functions
18		Lipoproteins- Classification, composition and their importance
19		Lipoproteins- Classification, composition and their importance
20		Sphingosine-Structure and functions
21		Role of lipids in cellular architecture and functions
22	III	Amino acids- Structure, classification and properties
23		Amino acids- Structure, classification and properties
24		Hendersen-Hasselbalch equation for ionization of amino acids
25		Primary, secondary, tertiary and quaternary structure of proteins
26		Primary, secondary, tertiary and quaternary structure of proteins
27		Structure of Myoglobin and Hemoglobin
28		Ramachandran Plot
29		Chemical reactions of Amino acids
30		Chemical reactions of Amino acids
31		Lab synthesis of Polypeptides
32		Determination of Amino acid sequence in proteins/polypeptides
33	IV	Enzymes as Biocatalysts-Enzyme classification
34		Mechanism of enzyme action-Specificity, active-site, activity unit and isozymes
35		Factors affecting enzyme efficiency
36		Enzyme activators, coenzymes and cofactors
37		Enzyme kinetics-Michaelis-Menten equation,
38		Determination of kinetic parameters, multi-step reactions
39		Enzyme inhibition-Reversible, Irreversible inhibition
40		Enzyme inhibition-Competitive,
41		Non-cometitive and Uncompetitive inhibition
42		Allosterism-Principles of allosteric regulation
43		Kinetic analysis of allosteric enzymes
44		Kinetic analysis of allosteric enzymes
45	V	Vitamins-Discovery of Vitamins
46		Properties and functions of fat-soluble vitamins
47		Properties and functions of fat-soluble vitamins
48		Properties and functions of water-soluble vitamins
49		Properties and functions of water-soluble vitamins
50		Properties and functions of water-soluble vitamins

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Department of

Lesson Plan - M. Sc. Microbiology Sem I (July 2019 -Dec 2020)

Subject - Practical1

Paper I-Bacteriology

Paper II-Virology Mycology and Phycology

Teacher - Prof. Fatema Matkawala, Dr. Mukesh Patidar

Day/Lecture	Topic
1	Introduction to General instrumentation
2	Preparation of media
3	Staining techniques: Grams Staining
4	Endo spore staining
5	Capsule Staining
6	Cell wall Staining
7	Metachromatic Grannule staining
8	Isolation techniques- StreakPlate method
9	Isolation techniques- Pour Plate method
10	Determination of standard plate count
11	Determination of standard plate count
12	Preparation of McFarland scale
13	Factors affecting bacterial growth
14	Calculation of growth rate and generation time
15	Anaerobic cultivation methods- GasPak anaerobic jar
16	Isolation of Clostridium from soil and its identification
17	Isolation and characterization of actinomycetes
18	Cover slip culture study for study of morphological characters of actinomycetes
19	Isolation of coliphage from sewage
20	Determination of phage titre
21	Isolation and identification of economically important fungi
22	Measurement of fungal growth by biomass (mycelial dry weight) method
23	Isolation of algae from natural sources
24	Morphological studies of economically important algae (permanent slides)

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Department of Biosciences

Lesson Plan - M. Sc. Microbiology Sem I (July 2019 -Dec 2020)
Subject - Practical 2
Paper III-Immunology
Paper IV-Microbial Biochemistry

Teacher - Prof. Zahabiya Saifee,Dr. Mukesh Patidar

Day/Lecture	Topic
1	Differential leucocyte count
2	Separation of lymphocytes from blood by Ficoll-Hypaque density gradient method
3	Preparation of antigens of Salmonella typhi
4	Flocculation reaction-serodiagnosis of syphilis by VDRL test
5	Agglutination reaction-serodiagnosis of enteric fever by Widal test
6	Latex agglutination for detection of C reactive protein
7	Determination of ABO and Rh blood group type
8	Radial Immuno Diffusion (RID)
9	Outerlony Double Diffusion technique (ODD)
10	Immunoelectrophoresis
11	Enzyme Linked Immuno Sorbent Assay (ELISA)
12	Preparation of buffers and volumetric solutions
13	Qualitative tests for carbohydrates
14	Quantitative estimation of carbohydrates
15	Qualitative tests for proteins
16	Quantitative estimation of proteins
17	Qualitative tests for lipids
18	Determination of saponification value of fat
19	Quantitative estimation of DNA by Diphenyl amine (DPA) method
20	Quantitative estimation of RNA by Orcinol method
21	Study of factors affecting enzyme activity
22	Determination of specific activity of enzymes
23	Study the effect of substrate concentration on enzyme activity
24	Construction of Lineweaver Burk plot
25	Determination of Vmax & KM values

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Department of Biosciences

Lesson Plan - M. Sc. III semester (July 2019 -Dec2020)

Subject - Microbiology, Paper-I: Molecular Biology and Genetic Engineering

Teacher - Dr. Mukesh Patidar

Day/Lecture	Unit	Topic
1	I	Essential enzymes used in recombinant DNA technolohy
2		Essential enzymes used in recombinant DNA technolohy
3		Restriction digestion, Ligation and Transformation
4		Restriction digestion, Ligation and Transformation
5		Cloning vectors: Plasmids
6		Cloning vectors: Phages
7		Cloning vectors: Phages
8		Cloning vectors: Cosmids
9		Animal virus derived vectors: SV40, Vaccinia
10		Plant based vectors: Ti, Ri vectors
11		Artificial chromosomes as vectors: YAC and BAC vectors
12		Cloning strategies: Cloning and selection of individual genes
13		Cloning strategies: Cloning and selection of individual genes
14		Gene libraries-cDNA and genomic libraries
15		Gene libraries-cDNA and genomic libraries
16	II	Expression vectors-basic features of expression vectors
17		Promoters used in expression vectors
18		pMAL, GST, pET based vectors
19		Cassettes and Gene fusions
20		Fusion vectors-Translational and Transcriptional fusion vectors
21		Fusion vectors-Translational and Transcriptional fusion vectors
22		Recombinant protein purification-advantages of fusion proteins
23		Fusion proteins tags-His-tag, GST-tag, MBP-tag
24		Methods involved in recombinant protein purification
25		Methods involved in recombinant protein purification
26	III	DNA Sequencing methods: Maxam and Gilbert method
27		Sanger's sequencing method
28		Thermal cycle sequencing, Pyrosequencing
29		Automated sequencing method
30		Assembly of contiguous DNA Sequence
31		Gene amplification: PCR-principle, types and applications
32		Gene amplification: PCR-principle, types and applications
33		DNA microarray technique
34		DNA microarray technique
35	IV	Expression of cloned DNA-Expression in heterologous system
36		Study of the transcript of a cloned gene
37		Hybridization techniques-Colony hybridization, Plaque hybridization
38		in situ hybridization
39		Southern and Northern blotting
40		Western and Southwestern blotting
41		Modification of cloned DNA-Site-directed mutagenesis
42		Transposon mutagenesis
43	V	Applications of rDNA technology-Requirement and production of recombinant molecules in Pharmaceutical industries
44		Requirement and production of recombinant molecules in health and Agricultural sectors
45		Requirement and production of recombinant molecules in health and Agricultural sectors
46		Requirement and production of recombinant molecules in industrial sector and Research laboratories
47		Transgenic animals
48		Agrobacterium mediated transformation
49		Bt cotton, Gene therapy
50		Ethical and safety issues associated with recombinant DNA technology
51		IPR and patenting

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Department of Biosciences

Lesson Plan - M. Sc. Microbiology Sem III (July 2019 -Dec 2020)

Subject - Medical Microbiology

Teacher - Dr. Sheetal Bhasin, Amrita Jasani

Day/Lecture	Unit	Topic
1	I	Epidemiological studies of infectious diseases
2		Epidemiological studies of infectious diseases
3		Reservoirs and sources of diseases
4		Infection and its types
5		transmission of infections
6		Types of diseases-epidemic, endemic, pandemic, sporadic
7		Preventive and control measures for diseases
8		Hospital acquired infections and their prevention
9		Epidemiological Methods – Descriptive, Analytical
10		Experimental Epidemiology
11		Introduction to Centers for Disease Control and Prevention (CDC)
12		National Centre for Disease Control (NCDC)
13	II	Normal microbial flora of human body
14		Classification medically important microorganisms
15		Identification of medically important microorganisms
16		Opportunistic pathogens and true pathogens
17		Attributes predisposing to microbial pathogenicity- virulence: attenuation and exhaltation
18		infecting dose
19		Microbial pathogenicity
20		Mechanism and factors involved in establishment and spreading of infection
21		Adhesion, invasiveness, toxigenicity
22	III	Multidrug resistance: Antibiotics-types & mode of action
23		Types, biochemical mechanisms
24		Development of multidrug resistance
25		Guidelines for rational use of antibiotics
26		Multidrug-resistant organisms
27		Mehticillin resistant Staphylococcus aureus (MRSA)
28		Extended Spectrum β-lactamase (ESBL) producing Gram-negative bacreria
29		MDR & XDR tuberculosis
30		Carbapenum resistant Enterobacteriaceae (CRE)
31		Dengue hemorrhagic fever, Swine flu
32		Chicken gueniea, Ebola, SARS
33		Overview and current status of anti HIV, anti malaria and anti tuberculosis treatment
34		Etiology, clinical features, pathogenesis, laboratory diagnosis, transmission, prevention & control of diseases
35	IV	Gram positive cocci - Staphylococcus aureus
36		Streptococcus species
37		Gram positive bacilli - Clostridium species
38		Gram negative cocci- Neisseria species
39		Gram negative bacilli - E.coli
40		Salmonella species
41		Acid Fast Bacteria – Mycobacterium tuberculosis
42	V	Etiology, clinical features, pathogenesis, laboratory diagnosis, transmission, prevention & control of diseases
43		Actinomycetes- Actinomyces israelii
44		Spirochaetes- Treponema pallidum
45		Rickettsiae- Rickettsia species
46		Chlamydiae- Chlamydia species
47		Fungi: Microsporum
48		Fungi: Trichophyton
49		Fungi: Candida albicans
50		Virus- Hepatitis virus
51		Virus- HIV
52		Virus- Polio virus
53		Protozoa- Plasmodium species
54		Protozoa- Entamoeba histolytica

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Department of Biosciences

Lesson Plan - M. Sc. Semester-III (July 2019 -Dec2019)

Subject - Microbiology, Paper-III: Biostatistics and Bioinformatics

Teacher -Prof. Nikita Chordiya

Day/Lecture	Unit	Topic
1	I	Basic definitions and applications of statistics in biological research
2		Sampling: Representative sample, Sample size, Sampling bias
3		Sampling techniques
4		Data collection and representations: Types of data
5		Data collection and representations: Types of data
6		Methods of collection of primary and secondary data
7		Methods of data representation: Tabular, diagramatic
8		Graphical represntation by Bar diagram, Histogram, Polygon and Pie diagram
9		Measures of central tendency: Mean, Median and Mode
10		Measures of central tendency: Mean, Median and Mode
11		Measures of variability: Range, Mean deviation and Coefficient of variation
12		Measures of variability: Standard deviation, Standard error
13	II	Test for Significance: Small sample tests (Chi- square test)
14		Test for Significance: Small sample tests (t-test and F-test)
15		Test for Significance: Small sample tests (t-test and F-test)
16		Large sample test-Z- test
17		Large sample test-Z- test
18		Analysis of variance (ANOVA): Analysis of variance in one-way and two-way classification
19		Analysis of variance (ANOVA): Analysis of variance in one-way and two-way classification
20		Correlation and Regression: Positive and Negative correlations
21		Calculation of Karl-Pearson's coefficient of correlation
22		Linear regression and regressive equation
23		Introduction to Theory of Probability
24		Probability distributions
25	III	Introduction to Bioinformatics: History, aim and scope of bioinformatics
26		Database concept: DBMS
27		Classification of Biological databases and their functions: Nucleotide sequence databases: EMBL
28		Nucleotide sequence databases: GenBank and DDBJ
29		Protein sequence databases: SWISS-PROT, PIR
30		Nucleic acid and Protein structure databases: NDB and PDB
31		Protein structure classification databases: SCOP, CATH
32		Genome database and Composite database: NCBI
33		Specialized databases: ESTs, EXPASY
34		Specialized databases: Prosite, Pfam
35	IV	Basic concepts of sequence comparison, Sequence identity, similarity and homology
36		Scoring/Substitution matrices: PAM
37		Scoring/Substitution matrices: BLOSUM
38		Sequence database searching tools: BLAST, FASTA
39		Basic knowledge of variants of sequence database searching tools and their importance
40		Basic knowledge of variants of sequence database searching tools and their importance
41		Pairwise Local and Global sequence alignment algorithms: Needleman and Wunsch algorithm
42		Smith and Waterman algorithm
43		Multiple sequence alignment
44	V	Studying Open reading frames (ORFs), Motifs and their importance
45		Domains, Patterns, Profiles and their importance
46		Phylogenetic analysis: Basic concepts of Phylogenetic analysis
47		Rooted/Uprooted trees
48		Approaches for Phylogenetic tree construction: UPGMA
49		Approaches for Phylogenetic tree construction: Neighbourhood joining methods
50		Introduction to Operational Taxonomic units (OTUs)

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Department of Biosciences

Lesson Plan - M. Sc. Semester-III (July 2019 -Dec2019)

Subject - Microbiology, Paper-IV Applied Microbiology

Teacher - Prof. Shahwat Nigam

Day/Lecture	Unit	Topic
1	I	Biofertilizers and Bioinsecticides - Introduction
2		Production and methods of application: *Rhizobium* biofertilizer
3		Production and methods of application: *Azotobacter* biofertilizer
4		Production and methods of application: *Azospirillum* biofertilizer
5		Production and methods of app: *Azolla & Blue-Green Alage*
6		Production and methods of application: Phosphate solubilizing
7		QC of biofertilizers as per FCO - Method of analysis
8		QC of biofertilizers as per FCO - Standards of Biofertilizer
9		Production of Bioinsecticides : Candidate Microorganism
10		Production of Bioinsecticides : Safety and Production
11		Bioinsecticides : Advantages and Disadvantages
12		Introduction to Biofuel Production
13	II	Biogas- Subtrate Digesters
14		Biogas- Microorganisms
15		Biomethanation (Production of biogas)
16		Bioethanol production - sugar, molasses
17		Bioethanol production - starch and cellulosic materials
18		Recovery of ethanol
19		Biohydrogen-Microbial production
20		Microbial production of biodiesel from hydrocarbons
21		Microbial production of biodiesel from hydrocarbons
22		Algae as biofuel
23		Degradation of xenobiotics in the environment - Microbial
24		Degradation of xenobiotics in the environment - Microbial
25	III	Techniques of bioremediation: in situ and ex situ
26		Approaches to bioremediation- Intrinsic bioremediation
27		Approaches to bioremediation- Biostimulation & Bioaugmentation
28		Bioremediation of oil spills and metals
29		Bioremediation of oil lignins and hazardous wastes
30		Application of GMO in bioremediation
31		Biosensors- Definition and components of biosensors
32		Biosensors- Principle of operation
33		Methods of biomaterial and sensor coupling
34		Types of biosensors and its applications
35	IV	Bioleaching and Petroleum Microbiology - Introduction
36		General methods of bioleaching
37		Bioleaching of copper
38		Gold and Uranium extraction from low grade ores
39		Microbial Enhanced Oil Recovery (MEOR)
40		Microbial Enhanced Oil Recovery (MEOR)
41		Detrimental activity of microbes in petroleum industry
42		Detrimental activity of microbes in petroleum industry
43		Detrimental activity of microbes in petroleum industry
44	V	Bioplastics and Biosurfactants - Introduction
45		Bioplastics and its types
46		Genetically modified bioplastics
47		PHA- Properties and types
48		Chemical structure of PHA and PHA producing microbes
49		Modern trends in microbial production of bioplastics
50		Modern trends in microbial production of bioplastics
51		Applications of bioplastics
52		Biodegradability of bioplastics
53		Advantages and disadvantages of bioplastics
54		Advantages and disadvantages of bioplastics
55		Biosurfactants- Production
56		Biosurfactants- Application

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Department of Biosciences

Lesson Plan - M. Sc. Microbiology Sem 3 (July 2019 -Dec 2019)

Subject - Practical 1 Paper I-Molecular Biology and Genetic Engineering
Paper II-Medical Microbiology

Teacher - Dr. Sheetal Bhasin, Dr. Mukesh Patidar

Day/Lecture	Topic
1	Extraction of plasmid DNA and its analysis using agarose gel electrophoresis
2	Preparation of competent cells and transformation of DNA by using CaCl2
3	Determination of molecular size of DNA fragments
4	Restriction digestion of DNA samples using restriction endonucleases
5	DNA fingerprinting technique- Restriction Fragment Length Polymorphism-RFLP
6	To perform ligation of DNA fragments
7	DNA purification from electrophoresed agarose gel
8	DNA amplification by Polymerase Chain Reaction
9	DNA fingerprinting technique- Random Amplified Polymorphic DNA -RAPD
10	Blotting techniques (Demonstration)
11	Isolation, biochemical characterization and identification of medically important bacteria
12	Isolation, biochemical characterization and identification of medically important bacteria
13	Determination of antibiotic susceptibility pattern of pathogenic microbes
14	Study of synergistic and additive effect of antibiotics
15	Isolation and identification of resident normal flora from skin/throat
16	Effect of disinfectants on microflora of skin
17	Haematology : RBC Count,Total WBC Count, Differential WBC Count, Haemoglobin estimation
18	Laboratory analysis of urine-physical,chemical, microscopic and bacteriological analysis

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Lesson Plan - M. Sc. Microbiology Sem 3 (July 2019 -Dec 2019)

Subject - Practical 2

Paper III-Biostatistics and Bioinformatics

Paper IV-Applied Microbiology

Teacher - Nikita Chordiya, Shashwat Nigam

Day/Lecture	Topic
1	Diagrammatic and graphical presentation of statistical data using MS Excel
2	Calculation of standard deviation
3	Calculation of standard error
4	Application of tests of significance
5	Introduction to NCBI and its database
6	Variants of BLAST and FASTA
7	Sequence manipulation suite
8	Global pairwise alignment using Needleman-Wunsch Algorithm based ALIGN EMBOSS tool
9	Local pairwise alignment using Smith Waterman Algorithm based ALIGN EMBOSS tool
10	Multiple sequence alignment
11	Isolation of Rhizobium from root nodules
12	Isolation of Azotobacter from soil
13	Isolation of Azospirillum from soil
14	Isolation and characterization of phosphate solubilisers from soil
15	Isolation and characterization of PHA producing bacteria
16	Isolation and characterization of biosurfactant producing bacteria
17	Isolation and characterization of lignin degrading microorganisms
18	Isolation and characterization of dye degrading microorganisms from industrial effluents

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - M. Sc. Microbiology Sem II (Jan 2019 -June 2019)

Subject - Microbial Genetics

Teacher - Prof. Zahabiya Saifee

Day/Lecture	Unit	Topic
1	I	Structure of prokaryotic genome
2		Structure of eukaryotic genome
3		DNA structure & types
4		Experimental proof for DNA as genetic material
5		Modes of replication, Messelson & Stahl Exp
6		Models of replication
7		DNA replication- enzymes & mechanism
8		Inhibitors of repication
9	II	Spontaneous & induced mutation
10		Molecular nature of mutatino
11		Types of mutation
12		Mutagens- chemical & physical
13		DNA damage- deamination, oxidative damages
14		DNA damage- alkylation, pyrimidine dimers
15		Repair pathways- photoreactivation, excision repair
16		Repair pathways- mis match repair, recombination repair
17		SOS repair system & Ames test
18	III	Structure of rRNA, tRNA, mRNA
19		Transcription- basic principles
20		Transcription apparatus & types of RNA polymerase
21		Intiation, elongation & termination
22		Polycistronic & monocistronic RNA
23		Processing- methylation, capping, polyadenylation
24		Splicing of mRNA & tRNA
25		Inhibitors of RNA synthesis
26		Interaction between RNA polymerase & promotor regions, sigma factors
27		Ribozymes & RNAi
28	IV	Features of genetic code
29		Translation process- initiation, elongation & termination
30		Inhibitors of protein synthesis
31		Operon concept
32		Positive & negative control
33		catabolite repression, inducers & co-repressors
34		Lactose operon; trytophan operon
35		Arabinose operon; histidine operon
36	V	Gene transfer- transformation
37		Conjugation
38		Transduction
39		Transposons
40		Type of trasposons
41		Mechanism of transposition
42		Gene mapping

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - M. Sc. II Sem Microbiology (January 2019- June 2019)

Subject - Microbial Physiology

Teacher - Dr. Mukesh Kumar Patidar

Day/Lecture	Unit	Topic
1	1	Photosynthesis: Bacterial photosynthesis Introduction
2		Bacterial photosynthesis - Scope
3		Bacterial photosynthesis - Electron Carriers
4		Photosynthetic reaction center
5		Cyclic flow of electrons
6		Bacterial photophosphorylation in phototrophic bacteria
7		Bacterial photophosphorylation in phototrophic bacteria
8		Anoxygenic photosynthesis
9		Electrons donor in anoxygenic photosynthesis
10		Electrons donor other than water in anoxygenic photosyn.
11		Electrons donor other than water in anoxygenic photosyn.
12	2	Respiratory metabolism introduction
13		Embden-Mayerhoff pathway
14		Entner-Duodroff pathway
15		Glyoxalate pathway
16		Kreb's cycle
17		Oxidative and substrate level phosphorylation
18		Reverse TCA cycle
19		Gluconeogenesis,
20		Pasteur effect
21		Anaerobic respiration
22		Biochemistry of methanogens
23	3	Lipid Metabolism Introduction
24		Alpha oxidation of fatty acid
25		Beta and omega oxidation of fatty acid
26		Energy yields from fatty acid oxidation
27		Oxidation of unsaturated fatty acids
28		Fatty acids with odd numbered carbon atoms
29		Ketogenesis
30		Biosynthesis of fatty acid
31		Biosynthesis of fatty acid
32		Biosynthesis of triacylglycerol
33		Biosynthesis of triacylglycerol
34	4	Biosynthesis of amino acids
35		Biosynthesis of amino acids
36		Catabolism of amino acids
37		Catabolism of amino acids
38		Purine and pyridine biosynthesis- de novo pathway
39		Purine and pyridine biosynthesis- de novo pathway
40		Purine and pyridine biosynthesis- salvage pathway
41		Synthesis of polysaccharides as cell components
42		Synthesis of peptidoglycan as cell components
43		Synthesis of biopolymers as cell components
44		Synthesis of biopolymers as cell components
45	5	Metagenomic studies - Introduction
46		Unculturable and culturable bacteria
47		Conventional methods for the study of microbial diversity
48		Molecular methods for the study of microbial diversity
49		Extremophiles- Adaptation mechanism of acidophilic
50		Extremophiles- Adaptation mechanism of alkalophilic
51		Extremophiles- Adaptation mechanism of psychrophilic
52		Extremophiles- Adaptation mechanism of thermophilic
53		Extremophiles- Adaptation mechanism of barophilic
54		Extremophiles- Adap mechanism of osmophilic & halophilic
55		Quorum sensing in microorganisms

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Lesson Plan - M. Sc. II Microbiology (Jan 2019 - Jun 2019)

Subject - Instrumentation

Teacher - Dr. Sadhana Nighojkar

Day/Lecture	Unit	Topic
1	Unit 1	Microscopy-Theoretical considerations
2		Light Microscopy
3		Phase-contrast Microscopy
4		Interference Microscopy
5		Polarization Microscopy
6		Fluorescence Microscopy
7		SEM
8		TEM
9		STEM
10	Unit 2	Principles of RCF and Sedimentation coefficient
11		Mathematical calculations of centrifugal field
12		Preparative centrifugation
13		Differential centrifugation
14		Zonal and isopycnic separation
15		Density gradient centrifugation
16		Analytical centrifugation
17		Determination of molecular weight by sedimentation velocity & sedimentation equilibrium methods
18		Microcentrifuge, High speed & Ultracentrifuges
19		Determination of molecular weight by sedimentation velocity & sedimentation equilibrium methods
20	Unit 3	Principles of chromatography
21		TLC and Paper chromatography
22		Gel permeation chromatography
23		Ion exchange chromatography
24		Hydrophobic, Reverse-phase chromatography
25		Affinity chromatography
26		HPLC and FPLC
27		Gas chromatography
28	Unit 4	Polyacrylamide gel electrophoresis- native and gradient
29		DNA sequencing gels
30		SDS-PAGE
31		Isoelectric focusing, 2D Electrophoresis
32		Agarose gel electrophoresis- DNA gel electrophoresis
33		Pulsed field gel electrophoresis
34		RNA electrophoresis
35		Capillary electrophoresis
36		Radioactive isotopes- Detection
37		Radioactive isotopes- measurement of activity
38		Geiger-Muller counter
39		Solid & Liquid scintillation counters
40		Autoradiography
41		Autoradiography
42		Applications of autoradiography
43	Unit 5	Theory and application of Spectroscopy
44		UV, Visible Spectroscopy
45		Absorption and Emission Spectroscopy
46		Raman Spectroscopy
47		Fluorescence, MS
48		NMR, PMR
49		Mass spectrometry
50		API-electrospray and MADI-TOF
51		API-electrospray and MADI-TOF
52		Ionization mechanisms
53		Quadrapole mass spectroscopy

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Lesson Plan - M. Sc. II Microbiology (Jan 2019 - Jun 2019)

Subject - Bioprocess Technology

Teacher - Dr. Sheetal Bhasin, Fatema Matkawala

Day/Lecture	Unit	Topic
1	Unit 1	Isolation and screening microorganisms
2		Isolation and screening of microorganisms
3		Primary screening methods
4		Secondary screening methods
5		Secondary screening methods
6		Secondary screening methods
7		Maintainance of microorganisms
8		Maintainance of microorganisms
9		Microbial growth kinetics
10		Microbial growth kinetics
11		Microbial death kinetics
12		Strain improvement
13		Strain improvement
14		Media formulation
15		Media formulation
16		Industrial sterilization
17		Industrial sterilization
18		Inoculum development
19	Unit 2	Scale-up
20		Scale-up
21		Scale-down: Bioseperation
22		Scale-down: Cell disruption methods
23		Scale-down: Extraction
24		Scale-down: Purification by chromatography
25		Scale-down: Purification by chromatography
26		Scale-down: Drying
27		Scale-down: Formulation
28		Treatment of effluent and its disposal
29	Unit 3	Basic fermentor design
30		Batch, Fed-batch, Continuous process
31		Types of fermenters
32		Types of fermenters
33		Types of fermenters
34		Conventional fermentation v/s Biotransformation
35		Conventional fermentation v/s Biotransformation
36		Solid state fermentation
37		Surface fermentation
38		Submerged fermentation
39		Measurements and control of bioprocess parameters
40		Measurements and control of bioprocess parameters
41	Unit 4	Industrial production of Ethanol
42		Industrial production of Lactic acid
43		Industrial production of Acetic acid
44		Industrial production of Citric acid
45		Protease- production and purification
46		Amylase- production and purification
47		Steroid Bioconversions
48		Steroid Bioconversions
49	Unit 5	Industrial production of Glutamic acid
50		Industrial production of Lysine
51		Industrial production of Vitamin B12
52		Industrial production of Riboflavin
53		Industrial production of Penicillin
54		Industrial production of Streptomycin
55		Enzyme immobilisation
56		Enzyme immobilisation
57		Whole cell immobilisation
58		Applications of immobilization

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Lesson Plan - M. Sc. II Microbiology (Jan 2019 - Jun 2020)

Subject - Practical1 Paper I-Microbial Genetics

Paper II-Micr!obial Physiology

Teacher - Dr. Sheetal Bhasin, Prof. Zahabiya Saifee

Day/Lecture	Topic
1	Isolation of genomic DNA from bacterial cells and its analysis
2	Isolation of RNA from yeast cells and its analysis
3	Study of UV absorption spectra of nucleic acids
4	To check purity of DNA by spectrophotometric method
5	Study the lethal action of ultra violet radiation
6	Isolation of lac- mutants / auxotrophic mutants using ultra violet radiation as a mutagenic agent
7	Isolation of mutants by Replica Plate Method
8	Isolation of drug resistant mutants by Gradient Plate Method
9	Study the transfer of antibiotic resistance between bacterial species by conjugation process
10	Isolation of photosynthetic bacteria
11	Demonstration of phototrophic bacteria in Winogradsky column
12	Study of carbohydrate metabolism by oxidation/fermentation of glucose
13	Study of glucose breakdown products: Methyl red test, Voges-Proskauer's test
14	Study of catalase/oxidase activity in bacterial cultures
15	Study of lipid hydrolysis by microbial cultures
16	Study of degradation of tryptophan by bacterial culture
17	Study of degradation of sulfur containing amino-acids by bacterial culture
18	Measurement of microbial activity in soil by soil respiration method
19	Isolation of alkalophiles/acidophiles /halophiles by enrichment technique
20	Study of alkalophilic/alkalotolerant nature of bacterial isolates

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Lesson Plan - M. Sc. II Microbiology (Jan 2019 - Jun 2019)

Subject - Practical2 Paper III-Instrumentation

Paper IV-Bioprocess Technology

Teacher - Dr. Sheetal Bhasin, Dr. Mukesh Patidar

Day/Lecture	Topic
1	Paper chromatography
2	Thin Layer Chromatography
3	Gel Filtration Chromatography
4	Ion- Exchange Chromatography
5	Agarose gel electrophoresis
6	SDS-PAGE
7	Separation of cells/cell organelles by density gradient centrifugation
8	Antibiotic Producers (Crowded Plate , Wilkins Method)
9	Enzyme producers
10	Organic acid producers
11	Determination of antimicrobial spectrum of antibiotic producing isolates by agar ditch method
12	Production of ethanol by yeast using suitable substrates
13	Production of antibiotics/enzymes by submerged fermentation technology
14	Production of enzymes/organic acids by solid state fermentation technology
15	Downstream processing for microbial enzymes/antibiotics/organic acids
16	Immobilization techniques of cells/enzymes
17	Determination of Thermal Death Time (TDT) of microorganisms
18	Determination of Thermal Death Point (TDP) of microorganisms

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Lesson Plan - M. Sc. IV Sem Microbiology (January 2019 - June 2019)

Subject - Pharmaceutical Microbiology

Teacher - Dr. Sheetal Bhasin

Day/Lecture	Unit	Topic
1	1	Pharmaceutical Microbiology - Introduction
2		Role of a microbiologist in active pharma. ingredients prod.
3		Role of a microbiologist in active pharma. ingredients prod.
4		Role of a microbiologist in formulation units, R & D, QA
5		Role of a microbiologist in regulatory aspects
6		Intro to pharmacopoeia with special ref. to Indian,British,US
7		Role of Food and Drug Administration authority
8		FDA guidelines for drugs / biologicals
9		ISO, WHO and US certification
10		Good Manufacturing Practices (GMP)
11		Good Laboratory Practices (GLP)
12	2	Designing of microbiology laboratory
13		Safety in microbiology laboratory
14		Stand. operating proced. for microbio. assay of antibiotics
15		Stand. operating proced. for microbio. assay of vitamins & amino acids
16		Stand. operating proced. for microbio. assay of water analysis
17		Microbial limit test, Sterility test
18		Pyrogen test (BET), Area monitoring, Growth promotion test.
19		Calibration and validation of equipments
20		Microbial contamination and spoilage of pharmaceutical products
21		Microbial contamination and spoilage of pharmaceutical products
22		Chemical disinfectants, antiseptics and preservatives
23	3	Antibiotics and synthetic antimicrobial agents - Introduction
24		Structure, types and modes of action of antibiotics
25		Structure, types and modes of action of antibiotics
26		Beta lactams and non beta lactams
27		Aminoglycosides, Tetracyclines
28		Chloramphenicol, Macrolides
29		Fluroquinilones, Chemosynthetic drugs-Sulphonamides
30		Chemosynthetic drugs- Trimethoprim, Nitrofurans
31		Chemosynthetic drugs-Isoniazid
32		Antifungal and antiviral drugs
33		Antifungal and antiviral drugs
34	4	Molecular principles of drug targeting
35		Drug delivery system in gene therapy
36		Micro-encapsulation, Nanoparticles
37		Liposomes, Antibodies for drug delivery.
38		Antibodies for drug delivery, Penetrating defenses
39		How the antimicrobial agents reach the targets
40		How the antimicrobial agents reach the targets
41		Cellular permeability barrier
42		Cellular Transport system
43		Drug diffusion
44	5	Drug development in pharmaceutical process - Introduction
45		Objectives, Conduct of trials, Outcome of clinical trial Phase I and II
46		Objectives, Conduct of trials, Outcome of clinical trial Phase III and IV
47		Production of biopharmaceuticals by GEC - Humulin, Humatrope
48		Production of biopharmaceuticals by GEC -Interferons
49		Production of biopharmaceuticals by GEC- t-Plasminogen activator
50		Production of biopharmaceuticals by GEC - Mab and hybridoma tech.
51		Microbial fermentations (Streptokinase, Streptodornase).
52		New vaccine technology- DNA vaccines, synthetic peptide vaccines
53		New vaccine technology- Multivalent subunit vaccines
54		Application of microbial enzymes in pharmaceutical industry
55		Application of microbial enzymes in pharmaceutical industry

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Lesson Plan - M. Sc. IV Microbiology (Jan 2019 - Jun 2020)

Subject - Food and Dairy Microbiology

Teacher - Fatema Matkawala

Day/Lecture	Unit	Topic
1	Unit 1	Fermentation of bread
2		Fermentation of vinegar
3		Fermentation of beer
4		Fermentation of wine
5		Single cell proteins
6		Single cell oils
7		Probiotics and Prebiotics
8		Probiotics and Prebiotics
9		Mushroom cultivation
10		Mushroom cultivation
11		Genetically modified foods
12	Unit 2	Food infenctions - Gastroenteritis
13		Food infenctions - Salmonellosis
14		Food infenctions - Shigellosis
15		Food intoxications- Botulism
16		Staphylococcal intoxication
17		Mycotoxins
18		Mycotoxins
19		Microbiological examination of food
20		Microbiological examination of food
21		Quality assurance
22		Quality standards of food
23		Government regulatory practices and policies
24		Government regulatory practices and policies
25		FDA
26		FDA
27		EPA, HACCP, ISI
28	Unit 3	General principles of food preservation
29		General principles of food preservation
30		Preservation using high temperature
31		Preservation using high temperature
32		Preservation using low temperature
33		Preservation using low temperature
34		Chemical preservatives and food additives
35		Chemical preservatives and food additives
36		Chemical preservatives and food additives
37		Use of radiations for preservation
38		Spoilage of food - fresh food
39		Spoilage of food - canned food, milk products
40	Unit 4	Composition of milk
41		Normal flora of milk
42		Changes produced by microorganisms in milk
43		Pasteurization- basics
44		Pasteurization- basics and types
45		Milk borne diseases
46		Milk borne diseases
47		Microbiological examination of milk
48		Microbiological examination of milk
49		Grades of milk
50	Unit 5	Starter culture, Microbiology of cheese
51		Types of cheese
52		Types of cheese
53		Types of cheese
54		Yoghurt
55		Cultured butter milk
56		Acidophilus milk
57		Kefir, Kumiss
58		Microbial enzymes in dairy industry
59		Microbial enzymes in dairy industry
60		Utilization and disposal of whey

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Lesson Plan - M. Sc. IV Sem Microbiology (January 2019 - June 2019)

Subject - Enviornmental Microbiology and Phytopathology

Teacher -Dr. Mukesh Patidar

Day/Lecture	Unit	Topic
1	1	Aerobiology Introduction
2		Aerobiology Introduction
3		Droplet nuclei
4		Aerosol
5		Air Quality Assesment
6		Diseases and their preventive measures- Bacteria
7		Diseases and their preventive measures- Bacteria
8		Diseases and their preventive measures- Bacteria, Fungal
9		Diseases and their preventive measures- Fungal
10		Diseases and their preventive measures- Fungal, Viral
11		Diseases and their preventive measures- Viral
12	2	Soil Microbiology - Introduction
13		Physical Characteristics of Soil
14		Chemical Characteristics of Soil
15		Micro flora of various soil
16		Rhizosphere and Phyllosphere
17		Postive and Negative microbial interactions
18		Postive and Negative microbial interactions
19		Carbon Cycle
20		Nitrogen Cycle
21		Phosphorous Cycle, Symbiotic and Non Symbiotic Inter.
22		Mycorrhiza, Phosphate Solubilizing Bacteria
23	3	Introduction - Aquatic Microbiology
24		Assesment of water quality
25		Assesment of water quality
26		Water Purification
27		Water borne diseases and their control
28		Water borne diseases and their control
29		Waste Water Treatment - Primary
30		Waste Water Treatment - Secondary
31		Waste Water Treatment - Secondary
32		Waste Water Treatment - Tert., Characterization of Water
33		Biological Treatment of water
34		Solid waste treatment
35	4	Plant pathology - Introduction
36		Inanimate cause of plant disease
37		Animate cause of plant disease
38		Symptoms of plant diseases
39		Transmission of plant diseases
40		Bacterial plant diseases - Canker & gummoses
41		Bacterialplantdiseases-Crowngalls, Fireblight, Softrots,Wilts
42		Viral plant diseases - Cucumber mosaic disease
43		Viral plant diseases - Potato spindle disease, TMV
44		Fungal plant disease-Apple scab, Downy mildew of grapes
45		Fungal plant diseases - Late blight of potatoes, Wheat rust
46	5	Principles of plant disease control
47		Physical and chemical methods of disease control
48		Biocontrol of plant disease by micro organism
49		Biocontrol as an alternative to chemical pesticides
50		Microbial biocontrol agents – Bacteria
51		Microbial biocontrol agents – Bacteria, Fungi
52		Microbial biocontrol agents – Fungi
53		Mechanisms involved in biocontrol – Mycoparasitism
54		Mech. involved in biocontrol – Antibiosis, Competition
55		Integrated Control – Chemical-Biological control
56		Integrated Control - Physical-Biological control

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Lesson Plan - M. Sc. IV Sem Microbiology (January 2019 - June 2020)

Subject - Bio-Nanotechnology and Stem Cell Technology

Teacher - Dr. Anand Nighojkar

Day/Lecture	Unit	Topic
1	1	Nanotechnology: Definition and History
2		Potential uses of nanomaterials in electronics and robotics
3		Potential uses of nanomaterials in computers & sports equip.
4		Potential uses of nanomaterials in mobile electronic devices
5		Potential uses of nanomaterials in vehicles and transportation
6		Amalgamation of biology and nanotechnology
7		Amalgamation of biology and nanotechnology
8		Scope of bio-nanotechnology
9		Criteria for suitability of nanostructures for biological applications
10		Criteria for suitability of nanostructures for biological applications
11	2	Nanoparticles: Gold silver and their applications
12		Magnetic nanoparticles and their applications
13		Nanomaterials: Carbon Nanotubes (CNT)
14		Nanomaterials: Fullerens, diamondoid, nanoshells
15		Concept of top down process & bottom up processes for nano part. Syn.
16		Chemical Methods: Metal nanocrystals by reduction
17		Chemical Methods: solvothermal synthesis, photochemical synthesis
18		Chemical Methods: sonochemical routes, Chemical Vapor Deposition
19		Chemical Methods: Metal Oxide Chemical Vapor Deposition (MOCVD)
20		Physical Methods: Ball milling, electrodeposition
21		Physical Methods: Spray pyrolysis, flame pyrolysis
22		Physical Methods: DC/RF magnetron sputtering, (MBE)
23		Biological synthesis of nanoparticles using plant extracts & microorganisms
24	3	Drug delivery devices: Micro-electromechanical systems (MEMS)
25		Drug delivery devices: Nanoelectromechanical systems (NEMS)
26		Drug delivery system: Microcapsules, PEG-protein conjugates
27		Drug delivery system: Micelles, liposomes
28		Drug delivery system: Dendrimers, hydrogels
29		Quantum dots: synthesis & their app. in cancer diagnosis & treatment
30		Quantum dots: synthesis & their app. in cancer diagnosis & treatment
31		Nanobiosensors
32		Nano DNA Technology
33		Concept of Nanorobots and Nubots
34	4	Stem cells: Unique properties of stem cells
35		Formation of differentiated blood cells from hematopoietic stem cells
36		Formation of differentiated blood cells from hematopoietic stem cells
37		Types of stem cells
38		Properties and sources of adult and embryonic stem cells
39		Properties and sources of adult and embryonic stem cells
40		Advantages of adult and embryonic stem cells
41		Advantages of adult and embryonic stem cells
42		Disadvantages of adult and embryonic stem cells
43		Disadvantages of adult and embryonic stem cells
44	5	Production and harvesting of stem cells
45		Production and harvesting of stem cells
46		Assay of stem cells
47		Assay of stem cells
48		Stem cell therapy
49		Application of stem cells in drug development
50		Application of stem cells in drug development
51		Stem cell banking
52		Importance of stem cell research
53		Ethical issues of stem cell research
54		Guidelines for stem cell research in India

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Lesson Plan - M. Sc. IV Microbiology (Jan 2019 - Jun 2019)

Subject - Practical1 Paper I-Pharmaceutical Microbiology

Paper II-Food &! Dairy Microbiology

Teacher - Dr. Sheetal Bhasin

Day/Lecture	Topic
1	Validation of autoclave, hot air oven for sterilization efficiency
2	Calibration of laboratory equipments
3	Physico-chemical analysis of pharmaceutical products
4	Growth Promotion Test (GPT) and Growth Inhibition Test (GIT)
5	Environment and personnel monitoring
6	Bioassay of antibiotics/vitamins/aminoacids
7	Determination of Minimal Inhibitory Concentration (MIC) of antimicrobial pharmaceutical products
8	Disinfectant efficacy testing
9	Sterility testing for sterile pharmaceutical preparations
10	Microbial Limits Tests for pharmaceutical preparations
11	Bioburden estimation
12	Preservative Efficacy Testing for pharmaceutical preparations (PET)
13	Bacteriological analysis of food/Milk
14	Bacteriological analysis of food/Milk
15	Bacteriological analysis of food/Milk
16	Grading of milk-Methylene blue reduction time (MBRT) test / Resazurin test
17	To determine efficiency of pasteurisation of milk by phosphatase test
18	Production of fermented food products-bread, yoghurt, wine (Demonstration)

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Lesson Plan - M. Sc. IV Microbiology (Jan 2019 - Jun 2019)

Subject - Practical 2 Paper III-Environmental Microbiology and Phytopathology Paper IV-Bio-Nanotechnology and Stem Cell Technology

Teacher - Dr. Sheetal Bhasin, Dr. Mukesh Patidar

Day/Lecture	Topic
1	Microbiological analysis of air
2	Quantitative analysis of microorganisms present in soil
3	Evaluating the soil health of agricultural soil (Demonstration)
4	pH, organic carbon, phosphorus, potassium, ammoniacal-nitrogen, nitrate-nitrogen
5	Standard plate count (SPC) of Water/ Sewage
6	Most Probable Number (MPN) of coliforms/ Sewage
7	Routine coliform tests – Presumptive, Confirmed, Completed Test
8	IMViC tests
9	Eijkman Test
10	Membrane filtration technique
11	Determination of indices of pollution by measuring BOD/COD of different effluents
12	Isolation and characterization of Xanthomonas citri from citrus canker
13	Isolation and identification of fungal pathogens from diseased plants
14	Preparation of silver nanoparicles by chemical methods
15	Green synthesis of silver nanoparticles using plant extracts/microbial cells
16	Determination of antimicrobial activity of silver nanoparticles
17	Comparative analysis of antimicrobial activity of ionic silver and silver nano particles
18	Spectrophotometeric analysis of silver nano particles
19	Study of nano-silver coated gauze/textiles/nanoparticle containing products for antimicrobial activity