

**SEM II**

**BANKURA SAMMILANI COLLEGE**  
**Department of Microbiology**

**Microbiology Hons. (CBCS)**  
Syllabi module for Courses with **Lectures**

**2021-22**

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Biochemistry	Semester II	Theory	Core T-3	4

<b>Broad Topic</b>	<b>Lecture Number</b>	<b>Lecture Topic</b>
<b>Bioenergetics</b>	Lecture 1	First and second laws of Thermodynamics. Definitions of Gibb's Free Energy, enthalpy and Entropy and mathematical relationship among them
	Lecture 2	Standard free energy change and equilibrium constant, Coupled reactions and additive nature of standard free energy change
	Lecture 3	Energy rich compounds: Phosphoenol pyruvate, ATP
<b>Carbohydrates</b>	Lecture 4	General properties, classification of carbohydrates, families of monosaccharides
	Lecture 5	Structural concept of aldoses and ketoses, trioses, tetroses, pentoses, and hexoses (glucose and fructose). Stereo isomerism of monosaccharides, epimers and anomers of glucose, Mutarotation, optical isomerism
	Lecture 6	Furanose and pyranose forms of glucose and fructose, Haworth projection formulae for glucose; chair and boat forms of glucose
	Lecture 7	Sugar derivatives, glucosamine, galactosamine, muramic acid, N- acetyl neuraminic acid, Disaccharides; concept of reducing and non-reducing sugars, occurrence and Haworth projections of maltose, lactose, and sucrose
	Lecture 8	Polysaccharides, storage polysaccharides, starch and glycogen. Structural Polysaccharides, cellulose and peptidoglycan.
<b>Lipids</b>	Lecture 9	Fatty acids: definition, types, structures and functions, essential fatty acids.
	Lecture 10	Lipid: definition, nomenclature and classification with structures and properties
	Lecture 11	triacylglycerols, phosphoglycerides, phosphatidylethanolamine, phosphatidylcholine, sphingosine, ceramide, sphingomyelins, cerebrosides and gangliosides
	Lecture 12	Functions of lipid. Introduction of lipid micelles, monolayers, bilayers.
	Lecture 13	Functions of proteins, Primary structures of

<b>Proteins</b>		proteins: Amino acids, the building blocks of proteins. General formula of amino acid and concept of zwitterion
	Lecture 14	Titration curve of amino acid and its Significance, Classification, biochemical structure and notation of standard protein amino acids
	Lecture 15	Ninhydrin reaction. Non protein amino acids: Gramicidin, beta-alanine, D-alanine and D-glutamic acid
	Lecture 16	Secondary structure of proteins: Peptide unit and its salient features. The alpha helix, the beta pleated sheet and their occurrence in proteins
	Lecture 17	Tertiary and quaternary structures of proteins. Human haemoglobin structure, Quaternary structures of Proteins.
<b>Enzymes</b>	Lecture 18	Structure of enzyme: Apoenzyme and cofactors, prosthetic group-TPP, coenzyme NAD, metal cofactors
	Lecture 19	Mechanism of action of enzymes: active site, specificity, enzyme kinetics, Michaelis-Menten equation and their transformations, Km and allosteric mechanism.
	Lecture 20	Lock & key hypothesis, and Induced Fit hypothesis. Definitions of terms – enzyme unit, specific activity and turnover number
	Lecture 21	Multienzyme complex: pyruvate dehydrogenase; isozyme: lactate dehydrogenase, Enzyme inhibition: competitive- sulfa drugs; non-competitive-heavy metal salts, uncompetitive.
	Lecture 22	Effect of pH and temperature, substrate concentration, enzyme concentration, time on enzyme activity
<b>Vitamins and Nucleic Acids</b>	Lecture 23	Classification and characteristics of Vitamins with suitable examples, sources and importance
	Lecture 24	Purine, pyrimidine bases, nucleoside, nucleotide-structure & properties
	Lecture 25	Types of DNA and RNA

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Biochemistry	Semester II	Practical	Core P-3	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	2	Concept of pH and buffers, preparation of buffers – phosphate and acetate buffer
Exp. 2	Week 2	1	Qualitative/Quantitative tests for carbohydrates, reducing sugars, non-reducing sugars (DNS method)
Exp. 3	Week 3	1	Qualitative/Quantitative tests for proteins (Lowry method)
Exp. 3	Week 4	1	Qualitative/Quantitative tests for amino acids (Ninhydrine)
Exp.3	Week 5	1	Qualitative/Quantitative tests for DNA (DPA)
Exp. 3	Week 6	1	Qualitative/Quantitative tests for RNA (Orcinol)
Exp. 4	Week 7	2	Qualitative/Quantitative assay of amylase
Exp.5	Week 8	1	Study of enzyme kinetics – calculation of $V_{max}$ , $K_m$ , $K_{cat}$ values
Exp. 6	Week 9	2	Study the effect of temperature, pH and Heavy metals on enzyme activity (amylase).
Exp. 7	Week 10	1	Estimation of any one vitamin – Ascorbic acid.

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**2021-22**

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Virology	Semester II	Theory	Core T-4	4

<b>Broad Topic</b>	<b>Lecture Number</b>	<b>Lecture Topic</b>
<b>Nature and Properties of Viruses</b>	Lecture 1	Introduction: Discovery of viruses, nature and definition of viruses, general properties
	Lecture 2	Concept of viroids, virusoids, satellite viruses and Prions
	Lecture 3	Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses
	Lecture 4	Isolation, purification and cultivation of viruses
	Lecture 5	Viral taxonomy: Baltimore Classification
<b>Bacteriophages</b>	Lecture 6	Diversity, classification, lytic and lysogenic cycle of T4/T2 phage
	Lecture 7	concept of early and late proteins, regulation of transcription in lambda phage
<b>Viral Transmission, Salient features of viral nucleic acids and Replication</b>	Lecture 8	Mode of viral transmission
	Lecture 9	Structure, Nucleic acid, Replication and Symptoms of : Adenovirus, Retrovirus
	Lecture 10	Structure, Nucleic acid, Replication and Symptoms of : Hepatitis B virus, Influenza virus
	Lecture 11	Assembly, budding and maturation of HIV
<b>Viruses and Cancer</b>	Lecture 13	Introduction to oncogenic viruses, Types of oncogenic DNA and RNA viruses
	Lecture 14	Concepts of oncogenes and proto-oncogenes
<b>Prevention &amp; control of viral diseases</b>	Lecture 15	Antiviral compounds and their mode of action
	Lecture 16	Interferon and their mode of action
	Lecture 17	General principles of viral vaccination.
<b>Applications of Virology</b>	Lecture 18	Use of viral vectors in cloning and expression
	Lecture 19	Gene therapy and Phage display

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Virology	Semester II	Practical	Core P-4	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	1	Study of the structure of important animal viruses (Rhabdo) using electron micrographs
Exp. 1	Week 2	1	Study of the structure of important animal viruses (Retroviruses) using electron micrographs
Exp. 2	Week 3	1	Study of the structure of important plant viruses (TMV) using electron micrographs
Exp. 2	Week 4	1	Study of the structure of important plant viruses (Cucumber Mosaic Viruses) using electron micrographs
Exp. 3	Week 5	1	Study of the structure of important bacterial viruses (T4) using electron micrograph
Exp.3	Week 6	1	Study of the structure of important bacterial viruses ( $\lambda$ ) using electron micrograph
Exp. 4	Week 7	2	Isolation and enumeration of bacteriophages (PFU) from water/sewage sample using double agar layer technique
Exp. 5	Week 8	2	Studying isolation and propagation of animal viruses by chick embryo technique
Exp.6	May to June		Report a visit to any educational Institute/ Industry

**SEM IV**

**BANKURA SAMMILANI COLLEGE**  
**Department of Microbiology**

**Microbiology Hons. (CBCS)**  
Syllabi module for Courses with **Lectures**

**2021-22**

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Microbial Genetics	Semester IV	Theory	Core T-8	4

<b>Broad Topic</b>	<b>Lecture Number</b>	<b>Lecture Topic</b>
<b>Genome Organization and Mutations</b>	Lecture 1	Genome organization of <i>E. coli</i>
	Lecture 2	Mutations and mutagenesis: Definition and types of Mutations
	Lecture 3	Physical and chemical mutagens; Molecular basis of mutations; Uses of mutations
	Lecture 4	Reversion and suppression: True revertants; Intra- and inter-genic suppression; Ames test; Mutator genes
<b>Plasmids</b>	Lecture 5	Types of plasmids – F plasmid, R Plasmids, colicinogenic plasmids, Ti plasmids, linear plasmids
	Lecture 6	Plasmid replication and partitioning, Host range, plasmid-incompatibility
	Lecture 7	Plasmid amplification, Regulation of copy number, curing of plasmids
<b>Mechanisms of Genetic Exchange</b>	Lecture 8	Mode of viral transmission
	Lecture 9	Transformation - Discovery, mechanism, Identification of recombinants
	Lecture 10	Conjugation - Discovery, mechanism, Hfr and F' strains
	Lecture 11	Transduction - Generalized transduction, specialized transduction, LFT & HFT lysates
	Lecture 12	Mapping by recombination and co-transduction of markers
<b>Phage Genetics</b>	Lecture 13	Features of T4 genetics,
	Lecture 14	Genetic basis of lytic versus lysogenic switch of phage lambda
<b>Transposable elements</b>	Lecture 15	Prokaryotic transposable elements
	Lecture 16	Insertion Sequences, composite and non-composite transposons, Replicative and Non replicative transposition
	Lecture 17	Uses of transposons and transposition



<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Microbial Genetics	Semester IV	Practical	Core P-8	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	1	Preparation of Master and Replica Plates
Exp. 2	Week 2	2	Study the effect of chemical (HNO <sub>2</sub> ) and physical (UV) mutagens on bacterial cells
Exp. 3	Week 3	2	Study survival curve of bacteria after exposure to ultraviolet (UV) light
Exp. 4	Week 4	1	Isolation of Plasmid DNA from <i>E.coli</i>
Exp. 5	Week 5	1	Study different conformations of plasmid DNA through Agarose gel electrophoresis.
Exp.6	Week 6	1	Demonstration of Bacterial Conjugation
Exp. 7	Week 7	1	Demonstration of bacterial transformation
Exp. 7	Week 8	1	Demonstration of bacterial transduction
Exp.8	Week 9	1	Demonstration of AMES test

# BANKURA SAMMILANI COLLEGE

## Department of Microbiology

### Microbiology Hons. (CBCS)

Syllabi module for Courses with Lectures

2021-22

Course / Paper Name	Class	Course Type	Course Code	Credit
Environmental Microbiology	Semester IV	Theory	Core T-9	4

Broad Topic	Lecture Number	Lecture Topic
<b>Microorganisms and their Habitats</b>	Lecture 1	Structure and function of ecosystems,
	Lecture 2	Terrestrial Environment: Soil profile and soil microflora, Aquatic Environment: Microflora of fresh water and marine habitats, Atmosphere: Aeromicroflora and dispersal of microbes
	Lecture 3	Extreme Habitats: Extremophiles: Microbes thriving at high & low temperatures, pH, high hydrostatic & osmotic pressures, salinity, & low nutrient levels
<b>Microbial Interactions</b>	Lecture 4	Microbe interactions: Mutualism, synergism, commensalism, competition, amensalism, parasitism, Predation
	Lecture 5	Microbe-Plant interaction: Symbiotic and non-symbiotic interactions
	Lecture 6	Microbe-animal interaction: Microbes in ruminants, nematophagus fungi and symbiotic luminescent bacteria
<b>Biogeochemical Cycling</b>	Lecture 7	Carbon cycle: Microbial degradation of cellulose, hemicelluloses, lignin and chitin
	Lecture 8	Nitrogen cycle: Nitrogen fixation, ammonification, nitrification, denitrification and nitrate reduction
	Lecture 9	Phosphorus cycle: Phosphate immobilization and solubilisation
	Lecture 10	Sulphur cycle: Microbes involved in sulphur cycle, Other elemental cycles: Iron
<b>Waste Management</b>	Lecture 11	Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill)
	Lecture 13	Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter)
	Lecture 14	Secondary Treatment (activated sludge process and septic tank) and tertiary sewage treatment.

<b>Microbial Bioremediation</b>	Lecture 15	Principles and degradation of common pesticides
	Lecture 16	Degradation of organic (hydrocarbons, oil spills) and inorganic (metals) matter, biosurfactants.
<b>Water Potability</b>	Lecture 17	Treatment and safety of drinking (potable) water, methods to detect Potability of water samples:
	Lecture 18	standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms
	Lecture 19	Membrane filter technique and Presence/absence tests

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Environmental Microbiology	Semester IV	Practical	Core P-9	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	1	Analysis of soil - pH, moisture content, water holding capacity, percolation, capillary action.
Exp.2	Week 2	2	Isolation of microbes (bacteria & fungi) from soil (28°C & 45°C).
Exp. 3	Week 3	2	Isolation of microbes (bacteria & fungi) from rhizosphere and rhizoplane.
Exp. 4	Week 4	3	Assessment of microbiological quality of water.
Exp. 5	Week 5	1	Determination of BOD of waste water sample.
Exp.6	Week 6	2	Study the presence of microbial activity by detecting (qualitatively) enzymes (dehydrogenase) in soil.
Exp. 6	Week 7	2	Study the presence of microbial activity by detecting (qualitatively) enzymes (amylase, urease) in soil.
Exp. 7	Week 8	2	Isolation of Rhizobium from root nodules.

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**2021-22**

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Food & Dairy Microbiology	Semester IV	Theory	Core T-10	4
<b>Broad Topic</b>	<b>Lecture Number</b>	<b>Lecture Topic</b>		
<b>Foods as a substrate for microorganisms</b>	Lecture 1	Intrinsic and extrinsic factors that affect growth and survival of microbes in foods		
	Lecture 2	Natural flora and source of contamination of foods in general.		
<b>Microbial spoilage of various foods</b>	Lecture 3	Principles, Spoilage of vegetables, fruits		
	Lecture 4	Spoilage of meat, eggs, milk and butter, bread, canned Foods		
<b>Principles and methods of food preservation</b>	Lecture 5	Principles, physical methods of food preservation: temperature (low, high, canning, drying)		
	Lecture 6	irradiation, hydrostatic pressure, high voltage pulse, microwave processing and aseptic packaging,		
	Lecture 7	chemical methods of food preservation: salt, sugar, organic acids, SO <sub>2</sub> , nitrite and nitrates, ethylene oxide		
	Lecture 8	Antibiotics and Bacteriocins		
<b>Fermented foods</b>		Dairy starter cultures, fermented dairy products: yogurt, acidophilus milk, dahi and cheese		
	Lecture 9	Other fermented foods: dosa, sauerkraut, soy sauce		
	Lecture 10	Probiotics: Health benefits, types of microorganisms used, probiotic foods available in market.		
<b>Food borne diseases (causative agents, foods involved, symptoms and preventive measures)</b>	Lecture 11	Food intoxications: <i>Staphylococcus aureus</i> , <i>Clostridium botulinum</i>		
	Lecture 12	Mycotoxins;		
	Lecture 13	Food infections: <i>Bacillus cereus</i> , <i>Vibrio parahaemolyticus</i>		
	Lecture 14	Food infections: <i>Escherichia coli</i> , Salmonellosis,		
	Lecture 15	Food infections: <i>Yersinia enterocolitica</i> and <i>Campylobacter jejuni</i>		

<b>Food sanitation and control</b>	Lecture 16	HACCP
	Lecture 17	Indices of food sanitary quality and sanitizers
<b>Cultural and rapid detection methods of food borne pathogens in foods and introduction to predictive microbiology</b>	Lecture 18	Cultural and rapid detection methods of food borne pathogens
	Lecture 19	Predictive microbiology

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Food & Dairy Microbiology	Semester IV	Practical	Core P-10	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	1	MBRT of milk samples and their standard plate count.
Exp. 2	Week 2	1	Alkaline phosphatase test to check the efficiency of pasteurization of milk
Exp. 3	Week 3	2	Isolation of any food borne bacteria from food products.
Exp. 4	Week 4	2	Isolation of spoilage microorganisms from spoiled vegetables/fruits.
Exp. 5	Week 5	2	Isolation of spoilage microorganisms from bread.
Exp. 6	Week 6	1	Preparation of Yogurt/Dahi.

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Microbiology Hons. (CBCS)  
Syllabi module for Courses with Lectures

2021-22

Course / Paper Name	Class	Course Type	Course Code	Credit
Microbial Diagnosis In Health Clinics	Semester IV	Theory	SEC-2	4

Broad Topic	Lecture Number	Lecture Topic
<b>Importance of Diagnosis of Diseases</b>	Lecture 1	Bacterial and Viral Diseases of various human body systems
	Lecture 2	Fungal and Protozoan Diseases of various human body systems
	Lecture 3	Disease associated clinical samples for diagnosis
<b>Collection of Clinical Samples</b>	Lecture 4	Collection of clinical samples (Sputum, Skin, Blood, Urine and Stool) with proper precautions
	Lecture 5	Method of transport of clinical samples to the laboratory and storage
<b>Direct Microscopic Examination and Culture</b>	Lecture 6	Examination of sample by staining - Gram staining, Ziehl-Neelson staining, Giemsa staining
	Lecture 7	Preparation and use of culture media - Blood agar, Chocolate agar
	Lecture 8	Preparation and use of culture media - Lowenstein-Jensen medium, MacConkey agar
<b>Serological and Molecular Methods</b>	Lecture 9	Serological Methods - Agglutination, ELISA, Immunofluorescence
	Lecture 10	Nucleic acid based methods -PCR, Nucleic acid probes
<b>Kits for Rapid Detection of Pathogens</b>	Lecture 11	Typhoid, Dengue
	Lecture 12	HIV
<b>Testing for Antibiotic Sensitivity in Bacteria</b>	Lecture 13	Determination of resistance/sensitivity of bacteria against antibiotic (Penicillin/Streptomycin) using disc diffusion method
	Lecture 14	Determination of minimal inhibitory concentration (MIC) of an antibiotic (Penicillin/ Streptomycin)

**SEM VI**

# BANKURA SAMMILANI COLLEGE

## Department of Microbiology

**Microbiology Hons. (CBCS)**  
Syllabi module for Courses with **Lectures**

**2021-22**

Course / Paper Name	Class	Course Type	Course Code	Credit
Medical Microbiology	Semester VI	Theory	Core T-13	4

Broad Topic	Lecture Number	Lecture Topic
<b>Normal microflora of the human body and host pathogen interaction</b>	Lecture 1	Normal microflora of skin, respiratory tract, gastrointestinal tract, urogenital tract
	Lecture 2	Host pathogen interaction: Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Carriers, reservoir
	Lecture 3	Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses
	Lecture 4	Opportunistic infections, Nosocomial infections, Epidemic, Endemic, Pandemic
<b>Bacterial diseases</b>	Lecture 5	Symptoms, mode of transmission, prophylaxis and control of Respiratory Diseases: <i>Streptococcus pyogenes</i> ,
	Lecture 6	Symptoms, mode of transmission, prophylaxis and control of Respiratory Diseases: <i>Mycobacterium tuberculosis</i>
	Lecture 7	Symptoms, mode of transmission, prophylaxis and control of Gastrointestinal Diseases: <i>Salmonella typhi</i> ,
	Lecture 8	Symptoms, mode of transmission, prophylaxis and control of Gastrointestinal Diseases: <i>Vibrio cholerae</i>
	Lecture 9	Symptoms, mode of transmission, prophylaxis and control of <i>Bacillus anthracis</i> & <i>Treponema pallidum</i>
<b>Viral diseases</b>	Lecture 10	Symptoms, mode of transmission, prophylaxis and control of AIDS
	Lecture 11	Symptoms, mode of transmission, prophylaxis and control of Ebola
	Lecture 12	Symptoms, mode of transmission, prophylaxis and control of Dengue
	Lecture 13	Symptoms, mode of transmission, prophylaxis and control of Chikungunya
	Lecture 14	Symptoms, mode of transmission, prophylaxis and control of Japanese Encephalitis
<b>Protozoan</b>	Lecture 15	Symptoms, mode of transmission, prophylaxis



<b>diseases</b>		and control of Malaria,
	Lecture 16	Symptoms, mode of transmission, prophylaxis and control of Kala-azar
<b>Fungal diseases</b>	Lecture 17	Transmission, symptoms and prevention of Cutaneous mycoses: Tinea pedis (Athlete's foot)
	Lecture 18	Transmission, symptoms and prevention of Systemic mycoses: Histoplasmosis
	Lecture 19	Transmission, symptoms and prevention of Opportunistic mycoses: Candidiasis
<b>Antimicrobial agents: General characteristics and mode of action</b>	Lecture 20	Modes of action of Antibacterial, Antifungal and Antiviral agents with example

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Medical Microbiology	Semester VI	Practical	Core P-13	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	2	Identify bacteria ( <i>Bacillus</i> , <i>Staphylococcus</i> , <i>E. coli</i> , <i>Pseudomonas</i> ,) on the basis of cultural, morphological and biochemical characteristics
Exp. 2	Week 3	2	Study of composition and use of important differential media for identification of bacteria: EMBAgar, McConkey agar, Mannitol salt agar, TCBS
Exp. 3	Week 5	2	Study of bacterial flora of skin by swab method
Exp. 4	Week 7	2	Perform antibacterial sensitivity by Agar cup method
Exp. 5	Week 8	2	Determination of minimal inhibitory concentration (MIC) of an antibiotic (Penicillin/ Streptomycin)
Exp.6	Week 10	1	Study of various stages of Malarial parasite in RBC using permanent mount

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**2021-22**

Course / Paper Name	Class	Course Type	Course Code	Credit
Recombinant DNA Technology	Semester VI	Theory	Core T-14	4

Broad Topic	Lecture Number	Lecture Topic
<b>Introduction to Genetic Engineering</b>	Lecture 1	Milestones in genetic engineering and biotechnology
	Lecture 2	Mode of action and applications of Type I, II and III restriction endonuclease in genetic engineering
<b>Molecular Cloning-Tools and Strategies</b>	Lecture 3	Definition and function of restriction site, linkers, adaptors, Topoisomerase, DNA ligase, Genomic library
	Lecture 4	DNA Modifying enzymes: Terminal deoxynucleotidyl transferase, kinases, phosphatase
	Lecture 5	Definition and Properties of following Cloning Vectors: pBR322, pUC8, Bacteriophage lambda, M13, Cosmids
	Lecture 6	Cloning Vectors: BACs and YACs Mammalian SV40-based expression vectors
	Lecture 7	Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome
<b>Methods in Molecular Cloning</b>	Lecture 8	Viral mediated delivery, Agrobacterium - mediated delivery
	Lecture 9	Agarose gel electrophoresis & SDS-PAGE
	Lecture 10	Southern, Northern and Western blotting, dot blot and DNA microarray analysis
<b>DNA Amplification and DNA sequencing</b>	Lecture 11	Basic concept of PCR, RT-PCR, Real-Time PCR
	Lecture 13	Sanger's method of DNA Sequencing: traditional and automated sequencing
	Lecture 14	Primer walking and shotgun sequencing
<b>Construction and Screening of Genomic and cDNA libraries</b>	Lecture 15	Genomic and cDNA libraries: Preparation and uses
	Lecture 16	Screening of libraries : Colony hybridization and colony PCR
	Lecture 17	General principles of viral vaccination.
	Lecture 18	Chromosome walking and chromosome jumping
<b>Applications of Recombinant DNA Technology</b>	Lecture 19	Products of recombinant DNA technology: Insulin, hGH, Antisense molecules
	Lecture 20	Gene therapy, recombinant vaccines, proteinengineering and site directed mutagenesis

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Recombinant DNA Technology	Semester VI	Practical	Core P-14	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	1	Perform bacterial Transformation by standard method
Exp. 2	Week 2	1	Digestion of DNA using restriction enzymes and analysis by agarose gel electrophoresis
Exp.3	Week 3	1	Ligation of DNA fragments
Exp. 4	Week 4	1	Interpretation of sequencing gel electropherograms
Exp. 5	Week 5	1	Designing of primers for DNA amplification
Exp.6	Week 6	1	Demonstration of amplification of DNA by PCR
Exp. 7	Week 7	1	Perform Southern blotting

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<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Microbes In Sustainable Agriculture And Development	Semester VI	Theory	DSE-3	4

<b>Broad Topic</b>	<b>Lecture Number</b>	<b>Lecture Topic</b>
<b>Soil Microbiology</b>	Lecture 1	Soil as Microbial Habitat
	Lecture 2	Diversity and distribution of microorganisms in soil
<b>Mineralization of Organic &amp; Inorganic Matter</b>	Lecture 3	Mineralization of cellulose, hemicelluloses, lignocelluloses, lignin and humus
	Lecture 4	Mineralization of phosphate, nitrate, silica, potassium
<b>Microbial Activity in Soil</b>	Lecture 5	Carbon dioxide, methane – production and control
<b>Microbial Control of Soil Borne Plant Pathogens</b>	Lecture 6	Microorganisms used as biocontrol agents against Microbial plant pathogens
	Lecture 7	Microorganisms used as biocontrol agents against Insects & Weeds
<b>Biofertilization, Phytostimulation, Bioinsecticides</b>	Lecture 8	General concept of Biofertilizer
	Lecture 9	Phosphate solubilizing Microorganism
	Lecture 10	Nitrogen fixing Microorganism (Symbiotic and Non Symbiotic)
<b>Secondary Agriculture Biotechnology</b>	Lecture 11	Principle, advantages and processing parameters of Biomanure
	Lecture 13	Principle, advantages and processing parameters Biofuel
	Lecture 14	Principle, advantages and processing parameters of Biogas
<b>GM crops</b>	Lecture 15	Advantages, social and environmental aspects of Bt crops
	Lecture 16	Golden rice, transgenic animals

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Agriculture	Semester VI	Practical	DSE-3	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1 -3	3	Study soil profile
Exp. 2	Week 3 -5	3	Study microflora of different types of soils
Exp. 3	Week 6	2	Isolation and characteristics of Rhizobium from leguminous plant
Exp. 4	Week 4	1	Demonstration of biogas plant
Exp. 5	Week 5	2	Isolation of cellulose degrading microorganisms

# BANKURA SAMMILANI COLLEGE

## Department of Microbiology

### Microbiology Hons. (CBCS)

Syllabi module for Courses with Lectures

2021-22

Course / Paper Name	Class	Course Type	Course Code	Credit
Instrumentation & Biotechniques	Semester VI	Theory	DSE-4	4

Broad Topic	Lecture Number	Lecture Topic
<b>Microscopy</b>	Lecture 1	Brightfield and darkfield microscopy
	Lecture 2	Fluorescence Microscopy Phase contrast Microscopy, Confocal Microscopy
	Lecture 3	Electron Microscopy (Scanning and Transmission Electron Microscopy) and Micrometry
<b>Chromatography</b>	Lecture 4	Principles and applications of paper chromatography (including Descending and 2-D), Thin layer chromatography.
	Lecture 5	Column packing and fraction collection. Gel filtration chromatography, ion exchange chromatography and affinity chromatography
	Lecture 6	GLC, HPLC
<b>Electrophoresis</b>	Lecture 7	Principle and applications of native polyacrylamide gel electrophoresis & Agarose gel electrophoresis
	Lecture 8	SDS- polyacrylamide gel electrophoresis, 2D gel electrophoresis, Isoelectric focusing
<b>Spectrophotometry</b>	Lecture 9	Principle and use of study of absorption spectra of biomolecules. Analysis of biomolecules using UV and visible range
	Lecture 10	Colorimetry and turbidometry
	Lecture 11	Preparative and analytical centrifugation
<b>Centrifugation</b>	Lecture 13	Fixed angle and swinging bucket rotors. RCF and sedimentation coefficient
	Lecture 14	principle and application of differential centrifugation,
	Lecture 15	density gradient centrifugation and ultracentrifugation

<b>Course / Paper Name</b>	<b>Class</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Credit</b>
Instrumentation & Biotechniques	Semester VI	Practical	DSE-4	2

<b>Exp. Number</b>	<b>Class Plan</b>	<b>No. of Classes allotted</b>	<b>Experiment Name</b>
Exp. 1	Week 1	1	Study of fluorescent micrographs to visualize bacterial cells
Exp. 2	Week 2	1	Ray diagrams of phase contrast microscopy and Electron microscopy.
Exp. 3	Week 3	1	Separation of mixtures by paper / thin layer chromatography.
Exp.4	Week 4	1	Demonstration of column packing in any form of column chromatography.
Exp. 5	Week 5	1	Separation of protein mixtures by any form of chromatography.
Exp.6	Week 6	1	Separation of protein mixtures by Polyacrylamide Gel Electrophoresis (PAGE).
Exp. 7	Week 7	1	Determination of $\lambda$ max for an unknown sample and calculation of extinction coefficient.
Exp. 8	Week 8	1	Separation of components of a given mixture using a laboratory scale centrifuge.
Exp.9	Week 9		Industrial Tour