Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Biosciences

Lesson Plan - B. Sc. Year I Life Science (July 2020 -June 2021)

Micro+Chem+LS, BT+Chem+LS

Paper I- Introduction to Biochemistry, Cell Biology, Plant & Animal Diversity

Teacher - Prof. Baishali Roy

Day/Lecture	Unit	Topic
1	1	Carbohydrate Introduction and Properties
2		Classification of Carbohydrates
3		Classification of Carbohydrates and Functions
4		Lipids: Introduction
5		Classification, Structure and Function
6		Classification, Structure and Function
7		Vitamins: Introduction and Occurrence
8		Functions of Vitamins
9		Functions of Vitamins
10	2	Introduction to Amino Acids
11		Introduction to Proteins
12		Structure of Proteins
13		Functions of Proteins
14		Enzymes: Introduction & Classification
15		Factors affecting enzymaic activity
16		Mechanism of enzyme action
17		Kinetics of enzyme catalyzed reactions
18		Introduction to Nucleic Acids
19		Structure & Function of DNA
20		Structure & Function of RNA
21	3	Structure of Prokaryotic Cells
22		Structure of Eukaryotic Cells
23		Structure & Function of Plasma Membrane
24		Structure & Function of Plasma Membrane
25		Structure & Function of Endoplasmic Reticulum
26		Structure & Function of Golgi Apparatus
27		Structure & Function of Lysosomes & Ribosomes
28		Structure & Function of Mitochondria
29		Structure & Function of Chloroplast
30		Structure & Function of Nucleus
31		Cell division (Mitosis)
32		Cell division (Meiosis)
33	4	General Characteristics of Algae & its Economical Importance
34		General Characteristics of Fungi & its Economical Importance
35		General Characteristics of Lichens & its Economical Importance
36		General Characteristics & Adaptations of Bryophytes
37		General Characteristics & Adaptations of Pteridophytes
38		General Characteristics & Adaptations of Gymnosperms
39		General Characteristics of Monocot & Dicot Plants

40	5	Differences in Monocot & Dicot Plants
41		Anatomical Features of woody Plants
42		Economical Importance of Angiospermic Plants
43		General Characteristics of Annelieds & Arthropods
44		General Characteristics of Mollusca & Pisces
45		General Characteristics of Amphibians & Reptiles
46		General Characteristics of Aves & Mammals
47		Osmoregulation in Fishes
48		Parental Care in Amphibians
49		Salient features of Poisonous & Non- Poisonous Snakes
50		Flight Adaptation in Birds

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Department of Biosciences		
Lesson Plan - B. Sc. Year I Life Science (July 2020 -June 2021)		
Micro+Chem+LS, BT+Chem+LS		
Paper II- Environmental Biology, Genetics & Evolution		
Teacher - Dr. Monica Jain & Prof. Baishali Roy		
Day/Lecture	**Unit**	**Topic**
1	1	Structure & Function of Ecosystem
2		Factors of Ecosystem & Ecological Pyramids
3		Energy Flow in Ecosystem & Food chain
4		Food Web & Trophics Levels
5		Ecological factors - Ecological Adaptations in Plants & Animals
6		Aquatic & Dessert Adaptation
7		Ecological Succession - Hydrosphere & Xerosphere
8	2	Environmental Pollution : Air Pollution
9		Sources, Nature & Effect of Water Pollution
10		Sources, Nature & Effect of Soil Pollution
11		Sources, Nature & Effect of Noise Pollution
12		Sources, Nature & Effect of Nuclear & Radioactive Pollution
13		Ozone Layer Depletion & Acid Rain
14		Global Warming
15		Nitrogen Cycle
16		Carbon Cycle
17		Sulphur & Phosphorus Cycle
18		Biofertilizers & Biopesticides
19	3	Mendelian Laws of Inheritance
20		Incomplete Dominance & Codominance
21		Epistatsis, Complementary Ratio & Supplementary ratio
22		Cytoplamic Inheritance, Plastid & Kappa particles
23		Linkage & Crossing Over (Coupling & Repulsion Hypothesis)
24		Mechanism of Sex Determination
25		Sex linked Inheritance
26	4	Structure of Chromosomes
27		Polytene & Lampbrush Chromosomes
28		Chromosome related disorders - Klienfilter's Syndrome
29		Turner's Syndrome, Down Syndrome & Cri du chat Syndrome
30		Spontaneous & Induced Mutations
31		Chemical & Physical Mutagens
32		Molecular basis of Mutation
33	5	Theories of Organic Evolution - Lamarckism & Neo- Lamarckism
34		Darwinism & Neo- Darwinism
35		Germplasm Theory & Mutation Theory
36		Gene Pool & Random genetic Drift
37		Hardy Weinberg Law
38		Isolation & Types of Isolating Mechanisms
39		Instantaneous and Gradual Speciation

Maharaja Ranjit Singh College of Professional Sciences, Indore		
Department of Biosciences		
Lesson Plan - B. Sc. Semester III Life Science (July 2017 -June 2018)		
Micro+Chem+LS, BT+Chem+LS		
Paper I- Morphology, Developmental Biology & Physiology of Angiosperms		
Teacher - Dr. Monica Jain		
Day/Lecture	**Unit**	**Topic**
1	1	The Root System : Organization of Root Apex
2		Anatomy of Root in Monocotyledons & Dicotyledons
3		The Shoot System: Organization of Shoot Apex
4		Anatomy of Shoot in Monocotyledons & Dicotyledons
5		Anatomy of Leaf in Monocotyledons & Dicotyledons
6		Stomata: Mechanism of Stomatal movement
7		Secondary growth in Dicotyledons
8		Morphology of Flower
9	2	Microsporogenesis
10		Megasporogenesis
11		Pollination & Fertilization
12		Endosperm & Development of embryo in Monocotyledons & Dicotyledons
13	3	Plant Water Relations: Absorption of Water
14		Transpiration & Ascent of Sap
15		Photosynthesis: Photosyntehtic Apparatus
16		Pigments of Photosynthesis
17		Factors of Photosynthesis
18	4	Respiration: Glycolysis
19		TCA Cycle
20		Electron Transport in Mitochondria
21		Pentose Phosphate Pathway
22		Nitrogen Metabolism: Biological Nitrogen Fixation
23		Nitrate reduction & its regulation
24		Ammonia Assimilation
25	5	Structure & Function of Auxins
26		Structure & Function of Gibberlins
27		Structure & Function of Cytokinins
28		Structure & Function of Ethylene & Abscisic Acid
29		Photoperiodism & Vernalization
30		Phytochrome
31		Plant Movements: Autonomic or Sponataneous Movements
32		Paratonic or Induced Movements

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Department of Biosciences		
Lesson Plan - B. Sc. Semester IV Life Science (July 2017 -June 2018)		
Micro+Chem+LS, BT+Chem+LS		
Paper II- Morphology, Developmental Biology & Physiology of Mammals		
Teacher - Prof. Baishali Roy		
Day/Lecture	**Unit**	**Topic**
1	1	Digestive system of Mammals: Structure & Function
2		Digestion & Absorption of Carbohydrates
3		Digestion & Absorption of Lipids
4		Digestion & Absorption of Proteins
5		Secretory Function of Alimentary canal
6		Excretory System of Mammals: Structure & Function
7		Structure of Nephron
8		Formation of Urea
9		Formation of Urine
10	2	Respiratory System of Mammals: Morphology of Respiratory Organs
11		Mechanism of Respiration
12		Transport of Oxygen & Carbon dioxide by Blood
13		Circulatory System of Mammals: Morphology of Heart
14		Course of Blood Circulation
15		Composition of Blood & its functions
16		Mechanism of Blood Clotting
17	3	Muscular System of Mammals: Types of Muscles
18		Structure & Function of Muscles
19		Mechanism of Muscle Contraction
20		Nervous System of Mammals: Structure of Nervous Tissue
21		Neurons, Nerve fibers & Neuroglia
22		Mechanism of Nerve Impulse transmission
23		Reflex Action
24		Neuromuscular Junctions
25	4	Endocrine System of Mammals: Structure & Function of Pituatory gland
26		Structure & Function of Hypothalamus gland
27		Structure & Function of Thyroid gland
28		Structure & Function of Parathyroid gland
29		Structure & Function of Pancreas
30		Structure & Function of Adrenal gland
31		Disorders of Endocrine Glands

32		Disorders of Endocrine Glands
33	5	Reproductive system of Mammals: Structure of Male Reproductive Organs
34		Reproductive system of Mammals: Structure of Female Reproductive Organs
35		Female Reproductive Cycles (Menstrual & Oestrus Cycle)
36		Spermatogenesis
37		Oogenesis
38		Fertilization & its mechanism
39		Significance of Fertilization
40		Types and Patterns of Cleavage
41		Process of Blastulation
42		Formation of Germinal Layers
43		Extraembryonic Membranes
44		Placentation in mammals

Maharaja Ranjit Singh College of Professional Sciences, Indore		
Department of Biosciences		
Lesson Plan - B. Sc. Semester V Life Science (July 2017 -June 2018)		
Micro+Chem+LS, BT+Chem+LS		
Paper- Microbiology, Immunology and Animal Cell Culture		
Teacher - Prof. Sakina Indorewala		
Day/Lecture	**Unit**	**Topic**
1	1	Microbial Classification
2		Bacterial Classification (3 kingdom, 5 kingdom, 3 domain)
3		Bergey's Classification
4		Nutritional Classes of Bacteria
5		Microbiological Media & its Types
6		Pure Culture Isolation Techniques
7		Culture Maintanance
8		Staining Techniques: Simple & Gram's Staining
9		Differential & Acid Fast Staining
10		Bacterial Growth - Stages of Growth Cycle
11		Factors affecting Growth
12		Batch & Continuous Culture
13		Measurment of Bacterial Growth
14		Plasmids: Definition & Types
15		Identification & Classification of Plasmids
16		Bacterial Conjugation
17		F- mediated & Merozygotes
18		Transformation
19		Transduction (General & Specialized)
20		Viruses: General Characteristics
21		Classification & Replication of Bacteriophages
22	2	Design of Typical Fermentor
23		Control of Fermentation parameters
24		Batch & Continuous Fermentations
25		Down-Stream processing of Fermentation product
26		Production of Solvent - Ethyl Alcohol
27		Production of Antibiotic - Penicillin
28	3	Cells of Immune System
29		Organs of Immune System
30		Innate Immunity
31		Acquired Immunity
32		Primary & Secondary Immune Response
33		Humoral & Cell mediated Immunity
34		Humoral & Cell mediated Immunity

35		Antigens
36		Haptens & Epitopes
37		Antibody: Structure & types
38		Properties & Functions of Immunoglobulins
39	4	Antigen-Antibody reactions
40		Quantitative precipitin Titration
41		Immunological Techniques: Haemagglutination
42		ELISA
43		ODD & RID
44		Vaccines & Immunization
45		Animal Cell Culture: Culture Media
46		Primary & Secondary Culture
47		Cell lines
48		Growth Curve of Animal Cells in Culture
49	5	Transfection of Animal Cell Lines
50		HAT Selection & Selectable Markers
51		Antibiotic Resistance
52		Expression of Clone Proteins in Animal Cells & its uses
53		Stem cell Culture & its Applications

Maharaja Ranjit Singh College of Professional Sciences, Indore		
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Lesson Plan - B. Sc. Semester VI Life Science (July 2017 -June 2018)		
Micro+Chem+LS, BT+Chem+LS		
Paper - Molecular Biology, Genetic Engineering & Plant Tissue Culture		
Teacher - Prof. Sakina Indorewala & Dr. Monica Jain		
Day/Lecture	**Unit**	**Topic**
1	1	DNA Replication in Prokaryotes
2		DNA Replication in Eukaryotes
3		Semi Conservative Nature of DNA Replication
4		Transcription in Prokaryotes
5		Transcription in Eukaryotes
6		RNA Processing - 5' Cap formation
7		3' End Processing
8		Polyadenylation & Splicing
9		Transposable elements: Definition
10		Types of Bacterial transposons
11		Applications of Transposons
12		Genetic Code- Important Characteristics
13		Prokaryotic Translation
14		Eukaryotic Translation
15	2	Regulation of Gene Expression in Prokaryotes
16		Operon Concept- Lac Operon
17		Operon Concept- Trp Operon
18		Gene Regulation in Eukaryotic System
19		Promoters, Enhancers elements & Gene Amplification
20		Isolation of Genomic & Plasmid DNA from Bacteria
21		Isolation of Genomic DNA from Plant & Animal cells
22		Cloning Vectors (pUC 19, Phage 2, Cosmid & M13)
23		Restriction Enzymes
24		Other enzymes in Ligation Technology
25		Introduction of DNA into living cells
26	3	Methods of Gene Transfer
27		Expression & Detection of Clones
28		Introduction to Blotting Technique
29		Western Blotting
30		Southern Blotting
31		Northern Blotting
32		Introduction to PCR, RAPD & RFLP
33		Terms & Definition of Plant Tissue Culture
34		Media Ingredients
35		Various Media & Sterlizing Agents
36		Cell Culture : Initiation of callus & Isolation of Single cells
37		Suspension Cultures & Batch Cultures
38		Protoplast Culture & Cybrids
39		Applications of PTC in Horticulture, Agriculture & Pharmaceutical Industry
40		Clonal Propagation: General Techniques
41		Factors affecting Clonal Propagation
42		Applications of Clonal Propagation

43	5	Production of Haploid Plants
44		Factors affecting Androgenesis
45		Limitations & Applications of Androgenesis
46		Plant Transformation: Methods of Gene Transfer
47		*Agrobacterium tumefaciens* mediated Transformation
48		Direct Gene Transfer methods
49		Selection & Identification of transformed cells

Maharaja Ranjit Singh College of Professional Sciences, Indore	
Department of Biosciences	
Lesson Plan for B. Sc. I Year Life Science (July 2020- June 2021)	
BT+Chem+LS, Micro+Chem+LS	
Subject: Practicals	
Teacher - Prof. Dr. Monica Jain	
Day/Lecture	**Topic**
1	Qualitative analysis of Carbohydrates
2	Qualitative analysis of Carbohydrates
3	Qualitative analysis of Proteins
4	Qualitative analysis of Proteins
5	Qualitative analysis of Lipids
6	Study of different stages of Mitosis & Meosis using permanent slides.
7	Study of different stages of Mitosis by Onion root tip squash method
8	Study of different stages of Mitosis by Onion root tip squash method
9	Separation of Amino acids by Paper chromatography
10	Separation of Amino acids by Paper chromatography
11	Preparation of Herbarium
12	Preparation of Animal Album
13	Study of floral organs by dissection of flower & representing it by floral diagram & floral formula
14	To determine the frequency, density & abundance of vegetation by Quadrate method.
15	Study of ecological adaptations in Hydrophytes & Xerophytes.
16	Study of ecological adaptations in Hydrophytes & Xerophytes.
17	Soil Analysis
18	Soil Analysis
19	Water Analysis
20	Water Analysis
21	Working out the Laws of Inheritance
22	Study of Biogeochemical Cycles using Charts: Nitrogen Cycle
23	Study of Biogeochemical Cycles using Charts: Carbon Cycle
24	Study of Biogeochemical Cycles using Charts: Sulphur Cycle
25	Study of Biogeochemical Cycles using Charts: Phosphorus Cycle

Maharaja Ranjit Singh College of Professional Sciences, Indore	
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Lesson Plan for B. Sc. Semester III Life Science (July 2017- June 2018)	
BT+Chem+LS, Micro+Chem+LS	
Subject: Practicals	
Teacher - Dr. Monica Jain	
Day/Lecture	**Topic**
1	Perform histological study of root, stem & leaf for identification of monocotyledons & dicotyledons Plant System.
2	Perform histological study of root, stem & leaf for identification of monocotyledons & dicotyledons Plant System.
3	Study of floral organs by dissection of flower & representing it by floral diagram & floral formula
4	Separation & identification of leaf pigments by Paper chromatography
5	Separation & identification of leaf pigments by Paper chromatography
6	Study of Plasmolysis & Deplasmolysis using Tradescantia peel.
7	Study of Plasmolysis & Deplasmolysis using Tradescantia peel.
8	Effect of Auxin on Plant growth.
9	Effect of Cytokinin on Plant growth.

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Lesson Plan for B. Sc. Semester IV Life Science (July 2017- June 2018)	
BT+Chem+LS, Micro+Chem+LS	
Subject: Practicals	
Teacher - Prof. Dr. Monica Jain	
Day/Lecture	**Topic**
1	Estimation of Hemoglobin
2	RBC counting by Haemocytometer
3	WBC counting by Differential cell count
4	Blood Group test
5	Clotting time Estimation
6	Bleeding time Estimation
7	Study of different Developmental Stages of Chick Embryo
8	Study & Comment on the histological slides and charts related to: Digestive system, Excretory system, Respiratory system, Circulatory system, Muscular system, Nervous system, Endocrine system, Reproductive system, & Developmental Biology.

Maharaja Ranjit Singh College of Professional Sciences, Indore	
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Lesson Plan for B. Sc. Semester V Life Science (July 2017 - June 2018)	
BT+Chem+LS, Micro+Chem+LS	
Subject: Practicals	
Teacher - Fatema Matkawala & Zahabiya Saifee	
Day/Lecture	**Topic**
1	Monochrome staining
2	Gram's Staining
3	Negative Staining
4	Endospore Staining
5	Media Preparation: Nutrient Agar & Nutrient Media
6	Cultivation Technique: Streak Plate & Pour Plate method
7	Cultivation Technique: Streak Plate & Pour Plate method
8	Isolation and enumeration of microorganisms from air
9	Isolation and enumeration of microorganisms from air
10	Isolation and enumeration of microorganisms from water
11	Isolation and enumeration of microorganisms from water
12	Isolation and enumeration of microorganisms from soil
13	Isolation and enumeration of microorganisms from soil
14	Isolation of Amylase producers from Soil.
15	Isolation of Amylase producers from Soil.
16	Isolation of Protease producers from Soil.
17	Isolation of Protease producers from Soil.
18	Isolation of Antibiotic Producing microorganisms from Soil
19	Effect of UV radiation on Microorganisms.
20	Use of Ethyl Alcohol as Sterlilizing Agent.
21	Blood group analysis
22	Differential WBC count
23	To examine Flocculation reaction using VDRL test
24	To observe the Agglutination reaction using WIDAL test
25	Enumration of RBC
26	DOT ELISA
27	Oucterlony Double Diffusion Method
28	Oucterlony Double Diffusion Method
29	Determine the concentration of unknown antigen using Radial Immuo Diffusion technique
30	Determine the concentration of unknown antigen using Radial Immuo Diffusion technique

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Lesson Plan for B. Sc. Semester VI Life Science (July 2017 - June 2018)	
BT+Chem+LS, Micro+Chem+LS	
Subject: Practicals	
Teacher - Dr. Monica Jain & Zahabiya Saifee	
Day/Lecture	**Topic**
1	Chromosomal DNA isolation from Plant cells
2	Chromosomal DNA isolation from Plant cells
3	Genomic DNA isolation from Microorganisms
4	Genomic DNA isolation from Microorganisms
5	Chromosomal DNA isolation from Animal cells
6	Chromosomal DNA isolation from Animal cells
7	Germination of Seed in *in vitro* for Axenic cultures
8	Primary Establishment of culture from leaf & stem explants
9	Clonal Propagation
10	Anther & Pollen culture & check the Viability of Pollens