

**GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE,
RAJNANDGAON (C.G.)**



TEACHING PLAN

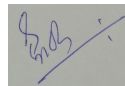
DEPARTMENT OF BIO TECHNOLOGY

2023-24

Dr. Pramod Kumar Mahish
Asst. Prof. of Biotechnology

Daily Diary Register
2022-23

Teaching Plan & Daily activity of
BSc I, II, III &
MSc Sem I/II, III & IV



Digitally signed by PRAMOD
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RAJNANDGAON (C.G.), ou=HIGHER
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Head of Department

Teaching Plan

B.Sc. sem I
Biotechnology

Paper -
Biochem & metabolism

month

Topics

September 22 metabolism - Glycolysis - Role of enzymes

October 22 krebs cycle - output of energy

November 22 Electron transport chain & β -oxidation of fatty acid.

Small

Teaching Plan

BSC II

Biotechnology

Paper - II

Recomb DNA Tech & Genom

Months

Topics

July 22

PCR - Types of PCR, Steps (Den, Ann & Ext)
App. Advantage & Limitation of PCR, App.

August 22

molecular markers - RFLP, RAPD & microarray
Human Genome Project

September 22

Gene transfer method - microinjection, Electro-
poration, Lipofection & microprojectile

October 22

Gene therapy, In vivo & Ex vivo, Germ
line & somatic Gene transfer

November 22

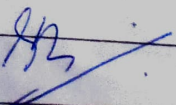
Basic idea of stem cell tech. types of
stem cells, culture & significance.

December 22

Introduction to Bioinformatics, History
objective & application. major Bioinfo
resource - NCBI

January 23

Types of databases (Primary &
Secondary) BLAST & FASTA. Basic
concept of Genomics & Proteomics



Teaching Plan

BSC III
Biotechnology

Paper 1
General Biotech.

month

Topics

July 22

General Intro & scope of EVS Biotech. Evs
Poll & its types

August 22

Solid waste management, Principle of mgmt,
Types of sources, Effect of solid waste.

September 22

concept of composting & vermicomposting
wastewater treatment - Physical, Chemical
& Biological

October 22

Biofertilizer & Biopesticides - cyanobact.
Bacteria, fungi, significance & Practice

November 22

Bioremediation of xenobiotics compounds
Types of IPR - Patents, copyright, Trademark
& Patenting genes & Life form

December 22

Types of Bioreactors, Design of Stirrer
tank, Fluidized bed, Fermentation Lactic
acid & Alcohol

January 23

Industrial Imp mto - Isolation, Preservation
& its App. Food Tech. Food spoilage, canning
Packaging & Food Preservation.

Teaching Plan

msc sem I
Biotechnology

Paper 3
micro & Biosafety

months

Topics

August 22

Systematics & Taxonomy Ribotyping & Burgeys manual, Prok. cell structure & func. cell wall of Gram + bac. Peptidoglycan & related mol.

September 22

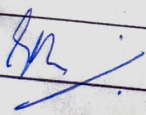
cell wall of Gram - bac. microbial growth measurement of growth, synchronous growth, growth aff. by env. factor. Photosyn. in mlo - Pigments & reaction. Chemolitho trophy sulphate red. Iron & methanogen, N_2 meta.

October 22

Archae - Halophiles, Thermo & Psychrophiles, Bact - Purple & green bac. Cyanobac. Glides & sheath bac. Endospore forming bac. Rickettsias, chlamydia & mycoplasma, viruses classification, structure & life cycle of virus Bact (Lambda), Plat (TMU) animal (Adeno Pox)

November 22

microbial disease - Tuberculosis, Typhoid, AIDS, Hepatitis, malaria, candidiasis, food & water born disease - cholera & diarrhoea. Biosafety Lab rules, biosafety cabinet, BS levels & pathogen. Biohazards & GRAS organisms, Ab mode of ac. & Resistance, Antifungal



B.Sc. Biotechnology Semester II

DSE Cell Biology

Month	Topics to be achieved
February 2023	Cell: Introduction and classification of organisms by cell structure.
March 2023	Compartmentalization of eukaryotic cells.
April 2023	Chemical components of biological membranes organization
May 2023	Fluid Mosaic Model and transport across membrane.

Head of Department

M.Sc. Biotechnology Semester II

Paper 5: Biostatistics & Computer Application in Biotechnology

Month	Topics to be achieved
January 2023	Unit I 1. Brief description and tabulation of data and its graphical representation. 2. Measures of central tendency and dispersion: mean, median, mode 3. Dispersion – Standard deviation and standard error
February 2023	Unit II 1. Simple linear regression 2. Correlation – types and measurement 3. Probability – addition and multiplication rules 4. Student ‘t’ test 5. Chi-square test 6. ANOVA
March 2023	Unit III 1. Introduction to digital computers: Organization; low – level and high – level languages; 2. Introduction to data structures and database concepts 3. Introduction to Internet and its application. 4. Computer – oriented statistical techniques: Frequency table, Computation of mean, Correlation and standard deviation.
April 2023	Unit IV 1. Introduction to Word processing, Spreadsheets and presentation software 2. Introduction to Image processing, video editing & Youtube 3. Internet platforms for the e-learning – online e-class room, online meeting & exam

M.Sc. Biotechnology Semester IV

Paper 15: Animal Biotechnology & Bio-ethics

Month	Topics to be achieved
January 2023	<ol style="list-style-type: none">1. Basic principle of animal tissue culture2. Laboratory requirement3. Different types of culture medium for animal tissue culture4. Primary and established cell line5. Application of animal cell culture
February 2023	<ol style="list-style-type: none">1. Basic techniques of mammalian cell culture2. Maintenance of cell culture3. Disaggregation – mechanical and enzymatic4. Stem cells – types, culture and its applications
March 2023	<ol style="list-style-type: none">1. Cell culture based vaccines – human and veterinary2. Apoptosis.3. Transgenic animals – mechanism of production and applications4. Tissue engineering and its applications
April 2023	<ol style="list-style-type: none">1. Ethical issues in biotechnology – Gene manipulation, experiments in animals and humans2. Animal rights, protection of biodiversity3. Biopiracy

Yogeshwari Tiwari

Self finance Teacher of Biotechnology

Daily Diary Register 2022-23

Teaching plan & Daily activity of
BSc I, II, III &
MSc Sem I/II, III/IV

Teaching Plan

BSc I Sem.

Unit - I - Structure, classification and Properties of Amino Acids. (September)

(October) - Types of Proteins and their classification

(November) Fibrous and Globular proteins.

Teaching Plan

BSc II Year

(August)

Paper-I Molecular biology and Biophysics.

Unit - I

- o Nucleic Acid - Bases, Nucleosides and nucleotides, (September) DNA and RNA structure.
- o Plasmids
- o Transposones - Repetitive elements, LINE & SINEs structure of genes.

Unit - II

- o DNA Replication - Enzymes involved and mechanism (October) of DNA replication in Prokaryotes.
- o Mutation - Molecular level of mutation, types of (November) mutagens, Spontaneous and induced.
- o DNA repair - NER, BER and mismatch repair.

Unit - III

(December)

Genetic Code - Features, Codons Assignment and wobble hypothesis.
(January)

Transcription - Initiation, Elongation and Termination
Translation machinery in Prokaryotes

(February 23)

- Operon - Concept of Operator, Regulator, Promoter gene, inducer and corepressor

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Teaching Plan

BSc III year

Unit - I

(August)

Concept of immunology - Innate and acquired, Humoral and cell mediated responses

(September)

- Cells and organ involved in immune system - structure and function.
- Antigen, Antibody - Types, structure and functions.

Unit - II

(October 22)

- Cytokines
 - Autoimmune diseases - Hemolytic Anemia, Rheumatoid arthritis, insulin-dependent diabetes.
- (November)
- Immuno deficiencies. Diseases - SCID, AIDS.

Unit III

(December 22)

- Antigen-Antibody interaction - Agglutination, Precipitation, RIA, ELISA, immunoelectrophoresis and immunofluorescence.

(January 23)

- Immunity of infectious disease - Protozoa (Malaria, kala-azar), Bacteria (T.B. Typhoid) and Virus (Influenza, pox)

(February 23)

- o Fundamental of Epidemic diseases.
Swine flu and Dengue.

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Teaching Plan

MSc I Sem

- Unit I -
- o Cell Discovery
 - o Cell Theory, Modern interpretation of cell theory.
- September
- o Structure of Prokaryotic and Eukaryotic cells.
 - o Cell cycle - Molecular events and checkpoints.
- Unit II -
- o Plasma membrane - lipid bilayer, Proteins, structure model & application
 - o Cell wall
 - o Cell organelle, Mitochondria, chloroplast, Nucleus and other organelles and their organization.
 - o Cytoskeleton - Microtubules, microfilaments.
- October
- Unit III -
- o Cell motility - Cilia, flagella of eukaryotes and prokaryotes.
- October
- o Extracellular matrix - Polysaccharides and Proteins.
- November
- o Transport of nutrients, ions and macromolecules across membranes - active and passive transport.
- Unit IV - Cellular response to environmental signal in plants and animals - Mechanism of signal transduction.
- November
- Biology of - cancer.
 - Cellular basis of differentiation and development.
 - Gametogenesis and fertilization.

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Teaching Plan

MSc III Sem

Unit I - Introduction - Phylogeny of immune system, innate and acquired immunity

August - Organization and structure of lymphoid organ.

September - Antigen, Antibody binding site
- Antibody structure and function.
- Antigen - Antibody interaction.

Unit II - Major Histocompatibility Complex
- Complement System

September - Cells of immune system - Hematopoiesis and differentiation, B-Lymphocytes, T-Lymphocytes, Macrophages, Dendritic cells, Natural killer and Eosinophils, Neutrophils and mast cells.

Unit III - Regulation of immune response - generation of humoral and cell mediated immune response, Activation of B- and T- Lymphocytes
October Cytokines and their role in immune regulation, immunological tolerance.

- Cell-mediated cytotoxicity - Mechanism of T-cell and NK cell mediated lysis, Antibody dependent cell mediated cytotoxicity, macrophage mediated cytotoxicity.

- Hypersensitivity, Autoimmunity.

Unit IV - Transplantation - General Concept and Application.

number - Immunity to infectious agents
Intracellular parasite, Helminthes and viruses
AIDS and other immunodeficiencies.

- Hybridoma Technology and monoclonal antibodies.

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B.Sc. I Semester.

Unit - II \Rightarrow Carbohydrates: Classification, Properties
Structure & Function of monosaccharides,
Oligo Saccharides - glycosidic bonds &
Polysaccharides - Structure and function
of starch & Cellulose.

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Head of Department

B.Sc. II Year | Unit- IV |

1. Biophysical : Introduction, Scope & Application.
2. Principle, Structure, Functions of the following:
 - a. Microscopy
 - b. Coloximeter & Spectroscopy
 - c. Electrophoresis
 - d. Centrifugation
 - e. Chromatography.

| Unit- V |

1. Radioisotopes techniques: Measurement of radiachd
Ionization Chamber's, Geiger Muller
& Scintillation Counter.
2. Autoradiography & DNA Fingerprinting
3. Biosensor.

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B. Sc. III Year.

Paper I -> General Biotechnology: Plant, Environment & Industrial Biotechnology.

Unit - I.

Introduction to Plant Cell & Tissue Culture:
History, Scope & Application.

Tissue Culture Media & Cellular Differentiation
Protoplast Isolation & Fusion, Organogenesis,
Embryogenesis, Anther & Ovary Culture.

Unit - II.

Agrobacterium Mediated Transformation T-DNA
Plasmid.

Bt Gene & Bt Cotton, Edible Vaccines & Geneti-
cally modified plants - Golden Rice, Herbicide
Resistance, Drought Resistance

Germplasm Storage & Cryopreservation.

M.Sc. I Sem

Genetics.

Unit - I

- 1 Introduction to Genetics
- 2 Mendel & Genetics: Mendel's laws of genetics; basic principle of Heredity
- 3 Gene - Types of Genes, Prokaryotic, Eukaryotic & V.
- 4 Fine Structure of gene, Eukaryotic genome Organization (Str. of chromatin, coding & non-coding sequences, satellite DNA).

Unit - II

- 1 Regulation of gene expression in Prokaryotes - Operon, antisense RNA in a gene regulation, Eukaryot gene regulation - RNA silencing
- 2 Mutation: Types of Mutation, Changes in chromosome number & structure: Euploidy & Aneuploidy, mutagen UV & Chemical mutagens, Ames test.

3 DNA Damage & Repair.

Unit - III

- 1 Inheritance: Autosomal & Sex linked, Extra-chromosomal inheritance, Inheritance of organelle genes
- 2 Cancer Genetics
- 3 Genetic Disorders & Syndrome
- 4 Sickle Cell Anaemia in Chhattisgarh

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Unit - IV

Bacterial Genetic System: Transformation, conjugation, transduction, Recombination.

Plasmids & Transposons

Viruses & Genetic system: Phage I & it's life cycle; RNA phages, RNA viruses & Retrovirus

Genetic system of Yeast & Neurospora.

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M.Sc. III

Environmental Biotechnology

Unit I

1. Environment: Basic Concepts & Issues
2. Environmental Pollution: Types of pollution, Methods for the measurements of pollution
3. Air pollution & it's Control.

Unit II

1. Water Pollution & it's Control: Water as a scarce natural resource, source of water pollution, Measurement of water pollution, water treatment - physical, chemical & biological treatment processes
2. Microbiology of waste water treatment:
Aerobic process: Activated sludge, Oxidation ditches, trickling filter, towers, rotating disc, rotating drums, Oxidation ponds.
3. Anaerobic process: Anaerobic digestion, Anaerobic filters, Up flow anaerobic sludge blanket reactors.

Unit III

1. Treatment schemes for waste waters of dairy, distillery, tannery, sugar, antibiotic industry
2. Bioremediation
3. Xenobiotics in Environment - Ecological

Consideration Oil pollution, Surfactants, pesticides

Electronic waste (E-waste)

Arsenic & Fluoride pollution in Rajnandgaon district.

Unit IV

1. Biopesticides in integrated pest management
2. Solid wastes: sources & management
(Composting, vermiculture & methane production)
3. IPR - Patent, Copyright, Trademark
4. Patent Filing & Protection.

