

ANDHRA MAHILA SABHA
ARTS & SCIENCE COLLEGE FOR WOMEN
(Autonomous)

SCHEME OF INSTRUCTION AND EVALUATION
BSc (BtZC) I Year I Semester

Subject	Course Title	Hours / Week		Exam Duration	Marks			No Of Credits
		Theo ry	Practi cal		Sem	Inter nal	Total	
Biotechnology	Cell Biology, Genetics & Biostatistics	4 Hrs	-	3 Hrs	80	20	100	4
Practicals								
Biotechnology	Cell Biology, Genetics & Biostatistics	-	2 Hrs	3 Hrs	50	Nil	50	1

SCHEME OF INSTRUCTION AND EVALUATION

BSc (BtZC) I Year II Semester

Subject	Course Title	Hours / Week		Exam Duration	Marks			No Of Credits
		Theo ry	Practi cal		Sem	Inter nal	Total	
Biotechnology	Microbiology & Immunology	4 Hrs	-	3 Hrs	80	20	100	4
Practicals								
Biotechnology	Microbiology & Immunology	-	2 Hrs	3 Hrs	50	Nil	50	

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Dr. B. Kariyanna

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SEMESTER-I
CORE THEORY-I
CELL BIOLOGY, GENETICS AND BIOSTATISTICS

Subject code: Bio 101

Instruction:	4 hours / week
Duration of semester examination:	3 hours
Duration of sessional examination:	1 hour
Semester examination:	80 marks
Sessional examination:	20 marks
Number of credits:	4

Course Objectives

- To understand intracellular organization of prokaryotic & eukaryotic cells & its morphology.
- To comprehend the molecular process of cell cycle, cell division and cell death.
- To understand the mechanism of inheritance and variation
- To comprehend the basic concepts of biostatistics and significance

Course Outcomes

- Knowledge on cytological architectural of prokaryotic & eukaryotic cell
- Attain Knowledge on the basic mechanism underlying in cell cycle, cell division and cell death
- Acquire the knowledge of traits inheritance from one generation to another
- Gain knowledge of sampling and measures of central tendency, probability and Hypothesis testing

Unit I: Cell Structure and Functions

- Cell as basic unit of living organisms - bacterial, fungal, plant and animal cells
- Ultrastructure of Prokaryotic cell: Cell membrane, Nucleoid, Plasmids
- Ultrastructure of Eukaryotic cell: Cell wall, Cell membrane, Nucleus, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi apparatus, Ribosomes, Lysosomes, Peroxisomes, Glyoxysomes
- Cell membrane - Fluid mosaic model, Sandwich model, Cell membrane permeability, Transport across membrane - active & passive transport, Cytoskeleton - microtubules & microfilaments
- Structure of Chromosome - chromatids, centromere, telomere, Components of chromosomes - histones & non histones
- Specialized chromosomes - Polytene & Lampbrush chromosomes

Unit II: Cell Division and Cell Cycle

- Bacterial cell division
- Phases of Eukaryotic Cell cycle
- Mitosis - Stages (Spindle assembly) & significance
- Meiosis - Stages (Synaptonemal complex) & significance
- Regulations of Cell cycle - proteins involved in check points
- Senescence, Necrosis and Apoptosis

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Unit III: Principles and Mechanism of Inheritance

- 3.1 Mendel's experiments on Pea plants, Mendel's Laws - Law of Dominance, Law of Segregation - Monohybrid Ratio, Law of Independent Assortment - Dihybrid ratio
- 3.2 Deviation from Mendel's Laws - Partial or Incomplete dominance (Eg. Flower Colour in *Mirabilis jalapa*), Co-dominance (Eg. MN Blood groups), Non Mendelian inheritance, Variegation in leaves of *Mirabilis jalapa*
- 3.3 Non allelic interactions - types of Epistasis
- 3.4 Penetrance and Expressivity (Eg. Polydactyly, Waardenburg syndrome), Pleiotropism, Multiple allelism (Eg. ABO Blood groups)
- 3.5 X-Y chromosomes - Sex determination in *Drosophila*, Birds, Man, *Bonellia*; Sex-linked inheritance - X-linked Inheritance (Hemophilia, Colour blindness), Y linked inheritance - Holandric genes
- 3.6 Linkage and Recombination - Cytological proof of crossing over (Ex: *Drosophila*) and phases of linkage, recombination frequency

Unit IV: Biostatistics-Basic Concepts -

- 4.1 Introduction to Biostatistics; Kinds of data & variables, sample size, methods of sampling - random & non-random, sampling errors
- 4.2 Diagrammatic (line diagram, bar diagram & pie diagram) and graphical representation of data (histogram, frequency polygon & frequency curve)
- 4.3 Measures of central tendency - mean, median, mode; merits and demerits
- 4.4 Measures of dispersion - range, mean deviation, variance and standard deviation, standard error, merits and demerits
- 4.5 Concepts of probability - probability rules, Probability distribution: Binomial & Poisson distributions (discrete distribution) and Normal distribution (continuous distribution)
- 4.6 Hypothesis testing - null and alternative hypothesis; Test of Significance (Student's t-test and Z-test). Chi-square test & its significance, ANOVA

Reference books

1. Cell & Molecular Biology by E.D.O. Robertis & E.M.F De Robertis, Waverly
2. The cell: A Molecular approach. Geoffrey M Cooper, Robert E Hausman, ASM press
3. Cell Biology and Genetics by P. K. Gupta.
4. Theory & problems in Genetics by Stansfield, Schaum out line series McGrawhill
5. An introduction to Genetic Analysis by Anthony, J.F. J.A. Miller, D.T. Suzuki, R.C. Richard Lewontin, W.M-Gilbert, W.H. Freeman publications
6. Biometry by: Sokal and Rohlf W.H. Freeman
7. Biostatistics by: N.T.J. Bailey
8. Fundamentals of Biostatistics: Khan and Khanum: **Ukmar publications, India**
9. Biostatistics; Jayasree Publishers by: Vishweswara Rao K

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SEMESTER-I

CORE PRACTICAL SYLLABUS
CELL BIOLOGY, GENETICS AND BIOSTATISTICS

Subject code: Bio 131

Instruction:

2 hours/ week

Duration of semester examination:

3 hours

Semester examination:

50 marks

Number of credits:

1

Practicals

1. Microscopic observation of cells: bacteria, fungi, plant and animal
2. Preparation of different stages of Mitosis (onion root tips)
3. Preparation of different stages of Meiosis (pollen mother cells in plants)
4. Monohybrid and Dihybrid ratio in Drosophila/Maize
5. Problems on Co-dominance
6. Problems on Epistasis
7. Problems on Mean, Median and Mode
8. Construction of bar diagram, pie diagram, line diagram, histogram
9. Problems on probability & probability distribution
10. Problems on Hypothesis testing – Student's t-test, Z-test, Chi-square test

SPOTTERS :

1. Prokaryotic cell (Bacteria)
2. Mitochondra,
3. Polytene chromosomes,
4. Test cross,
5. Crossing over,
6. Synaptonemal complex,
7. Chloroplast
8. Line diagram, bar diagram & Pie diagram
9. Histogram, frequency polygon & Frequency curve
10. Normal Probable curve

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ANDHRA MAHILA SABHA
ARTS & SCIENCE COLLEGE FOR WOMEN
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SEMESTER-II
CORE THEORY-II
MICROBIOLOGY & IMMUNOLOGY

Subject code: Bio 151

Instruction:	4 hours / week
Duration of semester examination:	3 hours
Duration of sessional examination:	1 hour
Semester examination:	80 marks
Sessional examination:	20 marks
Number of credits:	4

1. Course Objectives :

- A. To learn the general characteristics of microorganisms
- B. To gain knowledge of the sterilization methods and bacterial growth
- C. To understand an overview of different types of immunity, cells & organs involved in the immune system.
- D. To comprehend the immunoglobulins and autoimmune disorders

2. Course Outcomes :

- A. Understanding the basics of microbiology and microbial classification
- B. To culture different bacteria and know how to preserve them
- C. Remember, interpret, and use the basic concepts to have a comprehensive understanding of antigen-antibody interactions and their relevance in immunology
- D. Define, summarize, use, and analyse the knowledge, skills, and competencies to understand immunoassays effectively in various scientific and biomedical sciences

Unit I: Fundamentals of Microbiology

- 1.1 Historical development of Microbiology and Contributors of Microbiology
- 1.2 Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, Fluorescent microscopy, Scanning and Transmission Electron microscopy
- 1.3. Outlines of Classification of microorganisms, Methods of Classification
- 1.4. Structure and general characteristics of bacteria and virus
- 1.5. Disease-causing pathogens and symptoms (*Mycobacterium*, Hepatitis)
- 1.6. Structure and general characteristics of micro-algae and fungi

Unit II: Culture and Identification of Microorganisms

- 2.1. Methods of sterilization - physical and chemical methods
- 2.2. Bacterial nutrition - nutritional types of bacteria, essential macro, micronutrients and growth factors
- 2.3. Bacterial growth curve, batch and continuous cultures, synchronous cultures, measurement of bacterial growth-measurement of cell number and cell mass
- 2.4. Factors affecting bacterial growth

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- 2.5. Culturing of anaerobic bacteria and viruses
- 2.6. Pure culture and its characteristics

Unit III: Basics of Immunology

- 3.1 Types of Immunity - innate and adaptive Immunity
- 3.2 Cells of the immune system: T-cells, (helper and cytotoxic cells), B-cells, Natural killer cells, Macrophages, Basophils and Dendritic cells
- 3.3 Primary organs of immune system - Thymus and Bone marrow
- 3.4 Secondary organs of immune system - Spleen and Lymph nodes
- 3.5 Antigens-immunogenicity vs antigenicity, factors affecting antigenicity, Epitopes,
- 3.6 Haptens & types of adjuvants

Unit IV: Humoral and Cell Mediated Immunity

- 4.1 Structure of immunoglobulin- types and functions of immunoglobulins
- 4.2 Monoclonal antibody (MAbs) production and its applications
- 4.3 Major Histocompatibility Complex (MHC) & Human Leukocyte Antigen (HLA)- role in organ transplantation
- 4.4 Cell mediated immunity- T-cell receptor (TCR), Antigen Presenting Cells (APCs), ternary complex (TCR, peptide & MHC); cytokines
- 4.5 Hypersensitivity- types I, II, III & IV
- 4.6 Autoimmunity- Mechanisms of autoimmunity; Autoimmune diseases- Systemic lupus erythematosus, Rheumatoid arthritis

Reference books

1. Biology of Microorganisms by: Brock, T.D. and Madigan, M.T.
2. Microbiology by: Prescott, L.M., Harley, J.P. Klein, D.A.
3. Microbiology by: Pelczar, M.J, Chan, E.C.S., Ereig, N.R.
4. Microbiological applications by: Benson
5. Essential Immunology. Publ: Blackwell by: Roitt I.
6. Immunology. Publ: Blackwell by: Reeve G. & Todd I.
7. Cellular and Molecular Immunology. Saunders Publication, Philadelphia by: Abbas A.K., Lichtman A.H., Pillai S.
8. Kuby's Immunology by: W.M. Freeman and Company by: Golds R.A., Kindt T.J., Osborne

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SEMESTER-II
CORE PRACTICAL SYLLABUS
MICROBIOLOGY & IMMUNOLOGY

Subject code: Bio 181

Instruction:

2 hours/ week

Duration of semester examination:

3 hours

Semester examination:

50 marks

Number of credits:

1

Practicals

1. Sterilization methods – Autoclave, Hot Air Oven, Filtration
2. Preparation of microbiological media (bacterial, algal & fungal)
3. Isolation of bacteria by streak, spread and pour plate methods
4. Isolation of bacteria from soil
5. Simple staining and differential staining (Gram's staining)
6. Bacterial growth curve
7. Blood grouping
8. Single radial immunodiffusion
9. ELISA
10. Viability test of cells/bacteria (Evans blue test or tryphan blue test)

Spotters

1. Autoclave
2. Laminar air flow
3. Bacterial growth curve
4. Hot air oven
5. Serial dilution technique
6. Haptens
7. Major Histocompatibility Complex (MHC)
8. Immune Cells
9. Cell mediated immune response
10. Hypersensitivity

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