

Name of Faculty	:	Faculty of Science
Name of Program	:	Bachelor of Science
Course Code	:	2BSB02
Course Title	:	Cell Biology
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Basic knowledge of Chemistry, Cell Biology, Genetics and Biochemistry.
Course Objective	:	To provide students the basic knowledge of origin of life and recall about the concept of basic concept of cell. The purpose of the course is to give students to introduction of plant kingdom and give detail information about the life cycle of plant. To provide an understanding of animal kingdom and journey of primitive animals to advance animal. At the end of the course the students would have basic information about the microorganisms and role of microorganism in daily life.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	To understand the introduction, history and scope of biotechnology & structural organization of cells.
	CO2	To analyze the diversified functions of every organelles in the cell.
	CO3	To evaluate and differentiate sex linked inheritances.
	CO4	Understanding of the mechanisms and processes of cell division and cell cycle.
	CO5	Remember the structure and function of various cell organelles
	CO6	Remember about the different types of cells structure, functions and cell cycles.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
SEE	CIA	SEE	CIA					
3	0	2	4	50	25	50	25	150

Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P – Practical, C – Credit, SEE – Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)



Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping With Cos
1	Scope and Introduction to Biotechnology Topics: History & Introduction to Biotechnology, Scope of biotechnology in Agriculture, Industry, Medical and Environment, Branches of Biotechnology : i)Medical Biotechnology. ii) Industrial Biotechnology. iii) Marine and Aquatic Biotechnology. iv) Agricultural Biotechnology. v) Environmental Biotechnology, Biotechnology Research in India, Biotechnology in context of Developing World, Ethics in Biotechnology.	15	33.43%	CO1
2	Cell Structure and Function Discovery of Cell and Cell theory. Cell as basic unit of life (Viral, bacterial, fungal, plant and animal cells) Ultra structure of prokaryotic cell (Extra Chromosomal Material - Plasmid) Ultra structure of eukaryotic cell (Cell wall, cell membrane, Golgi Complexes, Endoplasmic Reticulum, Peroxisome, Lysosomes etc). Semi- autonomous Organelles (Mitochondria & Chloroplast: Endosymbiotic Theory)	10	22.22%	CO1 CO2 CO5
3	Chromosome Organization and Cell Division Chromosome organization in Prokaryotes and Eukaryotes Structure of specialized chromosomes (Polytene and Lamp Brush) Cell Division , Cell Cycle control Significance of Mitosis and Meiosis Programmed Cell Death.	10	22.22%	CO2 CO5
4	Sex Determination & Recombination Genes and environment - phenocopies Linkage and recombination - Discovery of linkage, cytological proof of crossing over, Recombination frequency and map distance. Interference and coincidence Mitotic crossing over in Drosophila Mechanism of sex determination-genic balance theory - Drosophila Homogametic and Heterogametic theory (Human, Mamalian, Birds) X - linked inheritance (eg. Haemophilia) Non-Mendelian inheritance - Cytoplasmic inheritance (Shell coiling in snail)	10	22.22%	CO3



Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	33.34	33.34	-	16.66	16.66	-

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1		02
2	Handling of instruments: Autoclave, Incubator, Centrifuges, spectrophotometer, microscope, hot air oven, pH meter	02
3	Identification of various stages of cell division mitosis and meiosis.	02
4	Epistasis and codominance, 2point test cross, gene mapping.	02
5	Preparation of polytenen chromosomes from Drosophila salivary gland.	02
6	Identificaiton, maintenace and culturing of Drosophila stock.	02
7	Identification of plant, fungi, bacteria and animal cells	02
8	Monohybrid and dihybrid ratio in Drosophila/maize	02
9	Preparation of different stages of Mitosis and Meiosis	02
10	Mitosis and Meiosis - onion root tip and grasshopper testis squash methods	02
11	Study of plasmolysis and de-plasmolysis	02
12	Demonstrate Cell fractionation and identification of cell fraction	02
13	Study the structure of plant cell through temporary mounts (onion/any plant of choice)	02
14	Cell wall and capsule staining	02
15	Staining of mitochondria and chloroplast of cell	02

Major Equipment/Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Colori meter
2	Ultraviolet-visible spectroscopy
3	Test tube
4	Thermometers
5	Freezer
6	Micro Pipettes
7	pH meter
8	Burettes and volumetric burette
9	Beakers
10	Bulb and graduated pipettes
11	Volumetric flasks.
12	Funnels



13	Microscope
14	Vials
15	Stirring or glass rods
16	Watch glass
17	Weight balance
18	TLC sheet / paper for chromatography
19	Permanent slides
20	Stains (dyes)

Suggested Learning Websites

Sr. No.	Name of Website
1	https://archive.nptel.ac.in/courses/102/106/102106096/
2	https://onlinecourses.nptel.ac.in/noc23_bt60/preview
3	https://onlinecourses.nptel.ac.in/noc23_bt56/preview
4	https://archive.nptel.ac.in/courses/102/108/102108086/

Reference Books

Sr. No.	Name of Reference Books
1	Cell Biology and Genetics - By P.K. Gupta
2	Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
3	De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
4	Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA
5	Becker, W.M., Kleinsmith, L.J., Hardin, J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
6	Cell Biology, DE Robertis & De Roberis, Blaze publishers & Distributors Pvt. Ltd.,
7	Cell and Molecular Biology - By De Robertis
8	Cell and Molecular Biology - By Lodish
9	Theory and Problems in Genetics - By Stransfield
10	Genetics - By Gardner (Macmillan Press)
11	Sinnott, E.W., L.C. Dunn & J. Dobshansky (1958): Principles of Genetics (5th Edition) McGraw Hill Publishing Co., N.Y. Toronto, London
12	Gardner, E.J. & Snusted, D.P. (1984): Principles of Genetics (7th edition) John Wiley & Sons, N.Y.
13	De Robertis, E.D.P and De Robertis E.M.F., 2001, Cell and Molecular Biology, 8th edition, Lippincott Williams and Wilkins, New York.
14	Lewin, B. (1985): Genes IV Wiley Eastern Ltd.,
15	Molecular Cloning by J. Sambrook and D. W. Russell (2001). Cold Spring Harbour Lab. Press
16	A short course in Bacterial Genetics by J.H. Miller (1992) Cold Spring Harbor Laboratory.



17	Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments, 6th Edition, John Wiley & Sons. Inc
18	Methods for Genetics and molecular Bacteriology by Ed. RGF Murray, WA. Wood & NB krieg (1994) American society for Microbiology