

COURSES OFFERED IN THE SECOND SEMESTER 4YR UGP BSC BIOTECHNOLOGY PROGRAM

KU 2 DSC BTC104: BASIC CELL BIOLOGY

Semester	Course Type	Course Level	Course Code	Credits		Total Hours/Week
2	DSC	Foundation level	KU 2 DSC BTC104	Total	4	5
				Module 1-3	3	
				Module 4	1	

	Learning Approach (Hours/ Week)			Marks Distribution (%) Ratio			Duration of ESE (Hours)
	Lecture	Practical	Tutorial	CE	ESE	Total	
Modules 1, 2, and 3	3			30	70	100	2
Module 4		2		40	60	100	2

Course Description:

The Basic Cell biology course introduces the fundamentals of a cell. Students will be able to understand the origin of a cell, different types of cells, its structure and function, cell division and cell death.

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the organization of cell, various level of cellular organization	U
2	Illustrate the structure of cell	U
3	Gain insights on genome organization	U
4	Understand cell cycle and cell division, consequences of uncontrolled cell division	U

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

	PSO 1	PSO 2	PSO 3	PSO4	PSO5	PSO6	PSO7
CO 1	√						
CO 2	√						
CO 3	√						
CO 4				√			
CO 5							

COURSE CONTENTS:

Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
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1	Module 1 Introduction to cell and cell theory		
	1	Cell as a basic unit of life- brief introduction on theory of biogenesis and abiogenesis, early conditions on earth- Haldane and Oparin theory of the origin of life, Urey-Miller experiment, Fox's experiments. Robert Hooke –Discovery of cells and cell theory.	6
	2	General organization of cells, broad classification of cell types-PPLO, bacteria, eukaryotic microbes, plant cell and animal cell.	4
	3	Different levels of organization-cell, tissue, organ, and organism as different level of organization	3
	4	Brief account on the structure of cell membrane and cytoplasmic matrix	2

2	Module 2 Cellular organization		
	1	Structure and functions of cell organelles-Structure and functions of cell organelles – Endoplasmic reticulum, Golgi complex, Mitochondria, Chloroplast, Ribosomes, Lysosomes, Peroxisomes, Nucleus (Nuclear envelope with nuclear pore complex, Nucleolus, Nucleoplasm and Chromatin). Vacuole, brief account on cytoskeleton structures (Microtubules, Microfilaments, and Intermediate filaments)	7
	2	Chromosome structure-General introduction, discovery, morphology, and structural organization-centromere, secondary constriction, telomere, chromonema, Organization of chromatin-Euchromatin and Heterochromatin, karyotype	4
	3	Nucleosome model, Single-stranded and multistranded hypothesis, folded- fiber, Nucleoproteins -histone and non-histone proteins	2
	4	Special type of chromosomes: Salivary gland and Lamp brush chromosomes	2

3	Module 3 Cell cycle and cell division		
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	1	Mitosis and meiosis – Phases and significance of cell cycle.	4
	2	Control of cell cycle- regulation of cell cycles (brief description on G1, S and G2 checkpoints, cyclins and Cdks),	5
	3	Cancer-brief account on the fate of cells undergoing uncontrolled division	3
	4	Apoptosis (brief account) - intrinsic & extrinsic pathways of programmed cell death	3

	Module 4 Practical		
4	1	Study of mitosis using onion root tip	5
	2	Barr body staining	5
	3	Observing meiotic stages under microscope (permanent slides)	10
	4	Measurement of cell size using micrometry	10

	Teacher Specific Module		5
5	<i>Directions</i>		
			5

Essential Readings:

1. Cytology, Verma P S and Agarwal V.K, 9 March 2021 S. Chand Publications, New Delhi, 978-8121908146
2. Cell Biology and molecular biology, N Arumugam, 1 January 2019 Saras publications

Reference Distribution:

Module	Unit	Reference No.
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1	1	1
	2	2
	3	2
	4	1
2	1	1
	2	1
	3	1
	4	1
3	1	1
	2	1
	3	1
	4	1
4	1	
	2	
	3	
	4	

Suggested Readings:

1. Karp's Cell and Molecular Biology (9th edition) Gerald Karp, Janet Iwasa, Wallace Marshall (2020) Wiley.

2. Molecular Cell Biology (9th edition) Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Kelsey C. Martin, Michael Yaffe, Angelika Amon (2021) W. H. Freeman.
3. Essential Cell Biology (7th Edition). Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Roff, Keeth Roberts, Peter Walter (2022) W. W. Norton & Company
4. The world of the cell (7th edition). Becker, Wayne M.; Kleinsmith, Lewis J.; Hardin, Jeff; Bertoni, Gregory Paul (2008) Benjamin Cummings.
5. The Cell: A Molecular Approach (9th Edition) Geoffrey M. Cooper and Kenneth W. Adams (2022) Oxford University Press.
6. Cell and molecular biology (8th edition) Eduardo D.P. DeRobertis and E.M.P. DeRobertis (2017) Lea & Febiger, U.S.
7. Cell Biology (4th edition) Thomas D. Pollard, William C. Earnshaw, Jennifer Lippincott-Schwartz, Graham Johnson (2023) f Elsevier.

Assessment Rubrics:

	Evaluation Type		Marks
Theory part	Continuous Evaluation	Test Paper	10
		Quiz/Debate/Seminar	10
		Assignment	5
	End Semester Evaluation		50
	Total		75

	Evaluation Type		Marks (%)
Practical Part	Continuous Evaluation	Lab performance	6
		Record	4
	End Semester Evaluation	Experiment	10
		Viva Voce	5
	Total		25

Percentage of marks in the course = (percentage of marks in theory * 3 + percentage of marks in practical) / 4

Employability for the Course / Programme

- Clinical diagnostics: Clinical research associate, laboratory technologist, medical researcher.
- Biotechnology Research Institutions: Research assistant, research associate, laboratory technician.
- Academia: Lecturer, academic researcher.

KU 2 DSC BTC 104: BIOCHEMISTRY FOR BIOTECHNOLOGY

	Semester	Course Type	Course Level	Course Code	Credits		Total Hours
	2	DSC	Foundation	KU 3 DSC BTC 104	Total	4	4
					Module 1-3	3	
					Module 4	1	
