



Course Title: Cell Biology
Course Code: GCMB301
Credit Units: 4

L	T	P/S	Lab	TOTAL CREDIT UNITS
3			2	4

Course Objectives:

The course is designed to explain the fundamentals of the structure and function of cells as the basic unit of living things and as the building blocks of multicellular organisms. It emphasizes the basis of sub cellular processes and their inter relationships at the cellular level.

Pre-requisites: basic biology

Student Learning Outcomes:

At the end of the course, the student should be able to:

- Define and describe the structure and function of basic components of prokaryotic and eukaryotic cells, specially cell membranes and sub-cellular organelles.
- Recognize how these cellular components perform their individual functions to make the cell a self sustaining, energy generating unit in it.
- Describe the process of cell growth, its duplication and division and identify the mechanism by which cells undergo equational and reductional division.
- Interpret and identify the mechanism of communication of a living cell with its environment and surroundings and analyze the mechanism which leads to the generation of response.

Module I	Weightage (%)
Descriptors/Topics: Cell as a basic unit of life and its evolution The Cell Theory, Modern concept of cell, Pre- cellular evolution, Endosymbiont theory, Overview of prokaryotic and eukaryotic cell types.	10
Module II	30
Descriptors/Topics: Intracellular organelles and their functions Plasma Membrane: various models of biological membrane, Membrane structure and composition: lipid bilayer, membrane carbohydrates, membrane proteins, channel proteins, carrier proteins and pumps, Transport across membranes- active, facilitated and passive transport. Nucleus: nuclear envelope, nuclear lamina, nuclear pore complex; Study of the GERL Complex: Golgi complex, Endoplasmic reticulum and Lysosomes. Peroxisomes and Ribosome.	
Module III	20
Descriptors/Topics: Cellular Energy Transduction Mitochondrial and chloroplast energy transformation: ultra structure of mitochondria and chloroplasts, structure and role of ATP synthetase. Oxidative and photophosphorylation. Proton gradient and chemiosmotic coupling.	
Module III	20

Descriptors/Topics: Cell growth and division cycle Cell cycle, Check-points, Cell Cycle Regulators – Cyclins and CDKs, Mechanics of cell division Mitosis and Meiosis; Programmed Cell Death: intrinsic and extrinsic pathways.	
Module IV	20
Descriptors/Topics: Signal Transduction Overview of extracellular signaling, modes of signaling, ligands and receptor molecules. G-protein coupled receptor, Secondary messengers (cAMP), Tyrosine kinase linked receptors.	

Pedagogy for Course Delivery:

Lectures: 42
Home Assignment 1
Class Test: 2
Total: 45

Lab/ Practical details, if applicable:

Practical: 13
Class Test: 2
Total: 15

List of Experiments:

- Microscopy- Working Knowledge of Light and Electron microscopy.
- Study of cell biology techniques: Pretreatment, Fixation and Staining of cells.
- Study of mitosis and meiosis from permanent slides.
- Preparation of temporary mount to study different stages of Mitosis.
- Preparation of temporary mount to study different stages of Meiosis.
- Study of chloroplast and stomata.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
75	25	70

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment						End Term Examination
Components (Drop down)	Class Test 1	Class Test 2	Home Assignment	Presentation/ Seminar	Attendance	
Weightage (%)	5	15	5	0	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination			Total
Components (Drop down)	Performance	Lab record	viva	Attendance	Lab record	Performance	Viva	
Weightage (%)	15	5	5	5	10	50	10	70

Text:

- Cell and Molecular Biology, 7th edi, Gerald Karp, (2013) John Wiley and Sons Inc. ISBN-10: 1118206738.
- Becker's World of the cell – 8th edition, Harden, Kleinshmith and Bertoni. (2011) Pearson Education Cell. ISBN-13:9788184734508
- Cell and Molecular Cell biology, 8th edition, De Robertis and De Robertis, (2011) Lippincott Williams & Wilkins. ISBN-13:9788184734508

References:

- Molecular Biology of the Cell, 5th Ed, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, (2008) Garland Publishing Company. ISBN-13: 978-0815316206
- The Cell: A Molecular Approach. Cooper, G.M. and Hausman, R.E. V Edition., (2013) ASM Press & Sinauer Associates, MA. ISBN- 13: 978-0763739058.