

## BTS118:CELL BIOLOGY

L:3 T:0 P:0 Credits:3

**Course Outcomes:** Through this course students should be able to

CO1 :: recall the structural and functional differences between prokaryotic and eukaryotic cells, including viruses and viroids.

CO2 :: Describe the organization and dynamics of biological membranes, cytoskeleton, and cellular transport mechanisms.

CO3 :: analyze the structure and functions of subcellular organelles (ER, Golgi, lysosomes, nucleus) and their roles in intracellular transport and protein processing.

CO4 :: compare energy-producing organelles (mitochondria, chloroplasts) in terms of genome organization and protein targeting mechanisms.

CO5 :: illustrate the stages of the cell cycle, mitosis, and meiosis and explain the mechanisms of cell cycle regulation and programmed cell death.

CO6 :: evaluate the cellular basis of cancer, including the roles of key regulatory proteins, and propose the conceptual framework of malignancy and metastasis.

### Unit I

**An overview of cells** : Discovery of Cell, Basic Properties of Cell, Unity and diversity of Cells, Cell under the microscope, Prokaryotic and eukaryotic cells, Cell Architecture: Animal cell and plant cell, Cell Size and components, Viruses and Viroids

### Unit II

**Cell Membrane and Permeability** : chemical components of biological membranes, Organization and Fluid Mosaic Model, Fluidity of membranes and Factors that affect membrane Fluidity, Membrane proteins and their functions, Active transport and passive transport, Exocytosis and Endocytosis

### Unit III

**Cytoskeleton** : Structure and functions of Microtubules, Intermediate filaments and Actin Filaments

**The Nucleus of Eukaryotic Cell** : Nuclear Envelope- structure of nuclear pore complex, Nuclear lamina, Protein import and export through Nuclear pore complex, Regulation of Nuclear protein import and export

### Unit IV

**Endoplasmic reticulum** : export of proteins and lipids from the ER, Structure and types, targeting proteins to ER, protein folding and processing in ER

**Golgi complex** : organization of Golgi complex,, protein glycosylation within Golgi,, protein sorting and export from Golgi apparatus

**Lysosomes** : structure and function, lysosomes role in autophagy and phagocytosis

### Unit V

**Mitochondria** : organization and function, mitochondrial genome,, import of mitochondrial inner membrane proteins, protein sorting to different mitochondrial compartments

**Chloroplasts** : structure and function, chloroplast genome, import and sorting of chloroplast proteins

### Unit VI

**The Cell Cycle** : overview of cell cycle, mitosis and meiosis, cell cycle control system, programmed cell death

**Cancer** : cancer and cellular basis of cancer, Key proteins regulating cell death anticancer-agents, concept of malignancy, metastasis

### Text Books:

1. CELL BIOLOGY, GENETICS, EVOLUTION AND ECOLOGY by P S VERMA,, S. CHAND & COMPANY

### References:

1. ESSENTIAL CELL BIOLOGY by BRUCE ALBERTS, DENNIS BRAY, KAREN HOPKIN, ALEXANDER D JOHNSON, JULIAN LEWIS, MARTIN RAFF, KEITH ROBERTS, PETER WALTER,, GARLAND PUBLISHING

2. MOLECULAR CELL BIOLOGY by LODISH H, BALTIMORE., D, BERK,A., ZIPURSKY,S.L. MATSUDAIRA ,P. AND DARNELL, J.,, W. H. FREEMAN AND COMPANY

