LS 402—CELL BIOLOGY [3 credits]

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S No	Topic	Faculty	No. of lectures
1.	Introduction to the Cell: The evolution of the cell, From molecules to first cell, From Prokaryotes to eukaryotes, From single cells to multicellular organisms		
2.	How cells are studied: Microscopy: light microscopy; fluorescence microscopy; Phase contrast microscopy; Electron microscopy, Purification of cells and their parts Cell separation and culture, flow cytometry, Fractionation of cell contents, Tracing cellular molecular with radioactive isotopes and antibodies		
3.	The Plasma membrane, Membrane structure: The Lipid bilayer, Membrane proteins, Membrane carbohydrates, Membrane transport of small molecules, Membrane transport of macromolecules and particles; exocytosis and endocytosis		
4.	The Cell nucleus, Morphology and functional elements of eukaryotic chromosomes, Chromosomal DNA and its packaging and organization: The complex global structure of chromosomes and functions implications lampbrush Chromosomes, Polytene chromosomes, heterochromatin, centromeres		
5.	Organelles to the eukaryotic cell: The lysosomes, The peroxisomes, The Golgi apparatus, The endoplasmic reticulum		
6.	Mitochondria and chloroplast, Structure of the mitochondria and chloroplast, Oxidation of glucose and fatty acids, Electron transport and oxidative phosphorylation, Chloroplast and photosynthesis		
7.	Protein sorting: organelle biogenesis and protein secretion, synthesis and targeting, of mitochondria, chloroplast, peroxisomal proteins, translational modification in the ER. Intracellular traffic, vesicular traffic in the secretary pathway, protein sorting in the Golgi, traffic in the endocytic pathway, exocytosis		
8.	The cytoskeleton,the nature of cytoskeleton, Intermediate filaments, Microtubules, Action filaments, Cilia and centrioles, Organization of the cytoskeleton		
9.	Cell growth and division, Overview of the Cell cycle and its control, The molecular mechanisms for regulating mitotic events, Cell cycle control in mammalian cells, Checkpoints in		

	cell cycle regulation		
10.	Cell adhesions, cell junctions and the extracellular matrix, Cell cell adhesion and communication, Cell matrix adhesion, Collagen-		
	Neural Cell Biology	**B.N. Mallick**	
11	Excitable Cell/Tissue? Neuron and Muscle Neuronal Type and Properties	**1**	
12	Basis of transmembrane potential and excitability channels? Types? Active and Passive, Gated, Non-garted, voltage gated, chemical gated, and their biology	**4**	
13	Neuronal receptor and its Biology	**2**	
14	Action Potential, Receptor Potential, Synaptic potential Propagation of Nerve Impulse conduction Synapse-Communication between neurons, fast propagation of signals Types of synapses? Mechanism of Action, Properties of synapses	**4**	
15	Neurotransmitters – synthesis, release, mechanism of action Pre-Post-	**2**	
16	synaptic actions and their physiology; excitatory-inhibitory	**2**	
17	Glia – types, functions	**1**	
18	Axoplasmic flow, Growth of neurons, Degeneration and Regeneration Cellular Basis of Memory	**3**	
19	Basic Techniques to study Neural Cell-Biology	**1**	
		20+1	
	plus 1 quiz, one mid/end term		