

Cell Biology - Web course

COURSE DETAIL

Module*	Topics and Contents	No. of Lectures**
1.	<p>CELL STRUCTURE AND FUNCTION OF THE ORGANELLES</p> <ul style="list-style-type: none"> Eukaryotic and prokaryotic cells, plant and animal cells. Structure and function principles of membranes organization, membrane proteins, cytoskeletal elements and architecture, microtubules and microfilaments: structure and functions, structure of intermediate filaments, shaping of the cells and mechanical support, cytoplasmic micro reticular system (lattice) of cytoplasm, nucleus, mitochondria, ribosome, golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, chloroplast and vacuoles. Cell to cell integration. Cell locomotion (amoeboid, flagella, cilia). Types of cell functions, types of cell division, mitosis & meiosis, extra cellular matrix, cell cycle and molecules that control cell cycle. 	10
2.	<p>CHROMOSOMES STRUCTURE AND ORGANIZATION</p> <p>Chromosome, centrosome, telomere, chemical composition of chromatin, structural organization of nucleosomes, heterochromatin, polytene and lampbrush chromosomes, human chromosomes.</p>	4
3.	<p>TRANSPORT ACROSS CELL MEMBRANES</p> <p>Passive & active transport, permeases, sodium potassium, Ca²⁺ ATPase pumps, lysosomal and vacuolar membrane, ATP dependent proton pumps, cotransport symport, antiport, transport into prokaryotic cells, endocytosis and exocytosis, entry of viruses and toxins into cells.</p>	6
4.	<p>RECEPTORS AND GROWTH FACTORS</p> <ul style="list-style-type: none"> Structure, mechanism, action of receptors (Cytosolic, nuclear and membrane bound receptors), autocrine, paracrine and endocrine models, action, characterization of receptors. Plant growth factors and hormones - auxins, gibberellins, cytokines and others. Stoichiometry of cell growth and product formation. 	6



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5.	SIGNAL TRANSDUCTION Signal amplification, different models of Signal amplification, cyclic amp, role of inositol phosphates such as messenger's, biosynthesis of inositol tri phosphates, cyclic GMP and G proteins, role in signal transduction, calcium ion flux and its role in cell signaling, current models of Signal amplification, phosphorylation of protein kinases, regulation of protein kinases, serine-threonine kinases, tumor necrosis factor receptor families.	6
6.	CELL CULTURE Techniques for the propagation of eukaryotic and prokaryotic cells, cell line, generation of cell lines, maintenance of stock cells, characterization of cells, immunochemistry, morphological analysis techniques in cell culture, ex-plant cultures cell cultures, contamination, differentiation, three dimensional cultures, role of matrix in cell growth.	6
	Total	40

* Quiz and Assignment after regular and required interval; mid exam after module 3 and final exam after module 7.

** Numbers of lectures are tentatively fixed.

References:

TEXT BOOKS

1. Darnell J, Lodish H, Baltimore D, "Molecular Cell Biology", W.H. Freeman.
2. Kimball T.W., "Cell Biology", Wesley Publishers.
3. Cell biology by Kimbal (willey Pub).
4. Cell biology by S.C Rastogi (new age international Pub).

REFERENCES

1. De Roberties & De Roberties, "Cell Biology".
2. James D. Watson, "Molecular Biology of the Cell". Molecular aspects of Cell Biology by Garret and Grisham.