ZOS 453: MOLECULAR CELL BIOLOGY
Teaching Hours 10/Unit

COURSE OUTCOME

1. Structural organization of the cell and functioning of different cell organelles are taught.
2. Types of cell divisions in organisms and their scientific relevance is to be studied.
3. Student will gain an understanding of chemical and molecular processes that occur in and between cells.
4. In molecular biology, aspirant learns about how molecules interact within the cell to promote proper growth, division, and development.
5. This course will emphasize the molecular mechanisms of DNA replication, repair, and protein synthesis.
6. At the end of this course students should be excited about basic science and its applications and gain higher level thinking skills that is necessary for scientists.

UNIT-I

Discovery of cell, cell theory, prokaryotic and eukaryotic cells. Structural organization of virus, bacteria and eukaryotic cell- ultra structure of animal cell. Biomembranes : chemical composition and molecular arrangement, models of membranes (Davson – Danielli model, fluid mosaic). Cytoskeleton-Microtubules, microfilaments and their dynamics. Centrosome, cilia, flagella.

UNIT-II

Cell surface receptors, Celladhesion molecules, Cell Junctions, Membrane Transport: Difffusion (simple and facilitated) and active transport (primary and secondary).Second messenger system. Cell Signalling- from plasma membrane to nucleus, signal transduction. Structure and functions of Endoplasmic Reticulum and Golgi Complex.

UNIT-III

Structural organization of nucleus -components, nuclear pore complex, export and import of proteins. Nucleolus-structure and biogenesis of ribosomes. Morphology and functional elements of eukaryotic chromosomes-Centromere, nuclear organizers, Telomere, heterochromatin and Euchromatin.Molecular organization of chromatin, Nucleosome model.

UNIT-IV

Phases of cell-cycle, Cyclins and Cyclin dependent kinases. Regulation of Cdk-cyclin activity.Molecular aspects of Mitosis.Mitotic apparatus and movement of chromosomes. Mitotic poisons. Meiotic division and genetic recombination. Biology of ageing,
Apoptosis – definition, mechanism and significance.

UNIT-V

DNA as a data storage medium, C-value paradox, Evidences for DNA as genetic material. Transformation experiment. Structure of DNA and RNA, Replication of DNA in prokaryotes and eukaryotes.Transcription in prokaryotes and eukaryotes, RNA processing, Spliceosomes.Catalytic RNA.Translation in prokaryotes and eukaryotes.Effect of antibiotics on protein synthesis. Post translational modifications.

REFERENCES

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3. Darnell, J. H., Lodish J. H and Baltimore D. (1995) Molecular Cell Biology, Scientific American Books, New York.
4. De Robertis, E. D. P, De Robertis E. M.F (1995) Cell and Molecular Biology, VIII edition, Indian edition.
5. Friefelder, D. (1987) Molecular Biology, II Edition, Jones and Barlett Publishers Inc., Boston.
6. Karp, G (1996) Cell and Molecular Biology: Concepts and experiments, John Wiley, New York.
7. Lewin, B (Ed) 1996) Genes, VII edition, John Wiley and Sons, New York.
8. Kleinsmith, L. J. and Kish V. M (1995) Principles of Cell and Molecular Biology, II edition, Harper Collins College publishers.
9. Molecular cell biology: Bruce Alberts, etsl.
10. Molecular cell biology: David Baltimoe.
11. Principles of Biochemistry by Lehninger
12. Schlief, R. (1986) Genetics and Molecular Biology, Addison Wasley Publishing
13. Sheeler, P. and Bianchi D.E. (1987) Cell and Molecular Biology, III edition, John Wiley New York.
14. Watson, J. D, Hopkins N. H, Roberts J. W, Steitz J. A and Weiner A. M (1987) Molecular Biology of the Gene, Vol.I& II general principles, IV edition, The Benjamin Cummings Publishing Co., Inc.,