

PURPOSE

The course is aimed to make the students understand the structure and function of cell and its organelles. It also aims to introduce cytogenetics which forms the basis for other courses in genetics.

INSTRUCTIONAL OBJECTIVES

1. To know the basics about cell and its evolution.
2. To know about the structure and function of cell organelles
3. To understand the transport systems, molecular motors, cell signaling and regulation of cell
4. To know the basics of cytogenetics

UNIT I - OVERVIEW ON CELL AND LIFE (5 hours)

Origin and evolution of life, various theories and experiments on origin of life, chemistry of cell, cell theory, cell morphology and size, prokaryotes and eukaryotes.

UNIT II - CELL ORGANELLES – STRUCTURE AND FUNCTION (5 hours)

Plasma membrane, nucleus, nucleolus, mitochondria, chloroplast, ER, Golgi apparatus, peroxisomes, cytoskeleton and cell movement, ribosomes, lysosomes, centriole

UNIT III - TRANSPORT SYSTEMS AND MOLECULAR MOTORS (6 hours)

Control of Localization signals, protein sorting and transport, protein folding, vesicle transport, endocytosis and exocytosis, transport across membrane. Cytoskeletal motors.

UNIT IV - REGULATION OF CELL AND CELL SIGNALLING (6 hours)

Cell cycle and regulation, cell - cell interaction, ECM, Cell junctions (Adhesion, Gap and tight), plasmodesmata, desmosomes, signal transduction.

UNIT V - CYTOGENETICS (8 hours)

Chromatin, polytene chromosome, lamp brush chromosome; chromosome numerical abnormalities, structural abnormalities, autosomes and allosomes, sex determination, karyotyping, X chromosome inactivation.

TEXT BOOKS

1. Verma .P.S & Agarwal .K, “*Cell Biology Genetics Molecular Biology Evolution & Ecology*”, S Chand Publication, 2004.
2. Gupta .P.K, “*Cytogenetics*”, Rastogi Publications, 1995.

REFERENCES

1. Geoffrey M. Cooper, Robert E. Hausman., “*The Cell – A Molecular Approach*”, Sinauer Associates, Inc.; 6 Edition, 2013.
2. Gerald Karp, “*Cell and Molecular Biology Concepts and Experiments*”, Wiley 6th Edition, 2010.