

## Cytogenetic, Plant Pathology and Environmental Botany

Course Code: BEB510

Credit: 04 (L-3, T-1, P-0)

Contact Hours: 60

MM: 100

### Course objectives

1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
2. Students will understand how these cellular components are used to generate and utilize energy in cells
3. Students will understand the cellular components underlying mitotic cell division.
4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

**UNIT I: Techniques in Biology:** Principles of microscopy, light microscopy; phase contrast microscopy; fluorescence microscopy, confocal microscopy; sample preparation for light microscopy; Electron Microscopy (EM)- Scanning Electron Microscopy (SEM) and Transmission Electron Microscope (TEM); sample preparation for electron microscopy; X-ray diffraction analysis.

**UNIT II: Cellular system:** The Cell, cell division: Mitosis and Meiosis; Prokaryotic and Eukaryotic cells, cell size and shape, eukaryotic cell components; functions of membranes, models of membrane structure, fluidity of membranes, membrane proteins and their functions, permeability of the membranes, cell wall. Nucleus, Mitochondria, Chloroplast, ER, Golgi bodies, Lysosomes, Peroxisomes, Glyoxisomes; mitochondria and chloroplast DNA, semiautonomous nature and symbiont hypothesis; biogenesis.

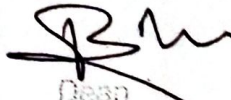
**UNIT III: Genetic material:** Miescher to Watson and Crick- historic perspective, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment, DNA structure, types of DNA, types of genetic material. DNA replication (Prokaryotes and eukaryotes): bidirectional replication, semi-conservative, semi discontinuous RNA priming,  $\theta$  (theta) mode of replication, replication of linear, dsDNA, replicating the 5' end of linear chromosome including replication enzymes, Protein Synthesis.


**UNIT IV: Recombinant DNA Techniques:** Blotting techniques; Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection, Molecular diagnosis of human disease, Human gene Therapy. **Suggested Readings**

- a. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
- b. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
- c. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
- d. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition.
- e. Pearson Benjamin Cummings Publishing, San Francisco. Plummer, DI. (1996). An Introduction to Practical Biochemistry. Tata McGraw- (ilt Publishing Co. Ltd. New Delhi. 3rd edition.
- f. Glick, Bit, Pasternak (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington

### Course outcomes

- Gain knowledge about "Cell Science.

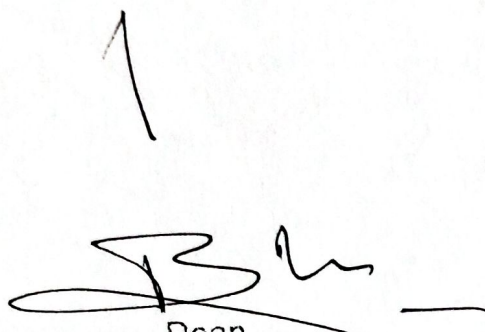
  
Dean  
Faculty of Education  
Invertis University  
Bareilly, 243123, UP


  
Registrar  
Invertis University  
Bareilly  
Department of Education  
Faculty of Education & Mass Comm.  
Invertis University, Bareilly (UP)



- Understand Cell wall Plasma membrane, Cell organelles and cell division.
- Learn the scope and importance of molecular biology.
- Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.
- Understand the process of synthesis of proteins and role of genetic code in polypeptide formation

↑

  
 Dean  
 Faculty of Education  
 Invertis University  
 Bareilly-243123, U.P

  
 Head  
 Department of Education  
 Faculty of Education & Mass Comm.  
 Invertis University, Bareilly (U.P)

  
 Registrar  
 Invertis University  
 Bareilly

### Chemistry Lab – V

**Course Code: BEB551**  
**Contact Hours: 30**

**Credit: 01 (L-0, T-0, P-2)**  
**MM: 50**

**Course Outline:**

1. To determine the Viscosity of given liquid at room temperature by using Ostwald's viscometer.
2. Determine the strength of given solution of HCl with standard NaOH solution.
3. To determine the concentration of given CuSO<sub>4</sub> solution calorimetrically.
4. To determine the heat of solution of given hydrated salt by solubility.
5. To determine the ionization constant of a weak acid conductometrically.