

**Syllabus and course structure for B.Sc. Botany for Leh Campus  
Effective from academic session 2015 and onwards**

**1<sup>st</sup> Semester**

**Course Code: BOT1**

**Course Name: B.Sc Botany**

**UNIT: I**

- i. **Cell structure:** Salient features of Prokaryotic and Eukaryotic cells.
- ii. **The cell envelope:** Plant cell wall-ultrastructure; Plasma membrane: Fluid Mosaic Organization (model)
- iii. **Non-membrane organelle:** Structure and function of Ribosomes
- iv. **Single membrane organelles:** Structure and function of Endoplasmic reticulum and Golgi bodies
- v. **Double membrane organelles:** Mitochondria and Plastids
- vi. **Nucleus:** Ultrastructure, nuclear envelope, nucleolus; and functions

**UNIT: II**

- i. **Chromosome organization:** Nucleosome organization, Morphology of chromosome; chemical composition, characteristics and role of centromere and telomere; giant chromosomes (polytene and lampbrush chromosomes)
- ii. **Genetic material:** Structure of DNA (Watson & Crick model), DNA replication (Semi-conservative), DNA as genetic material (experimental proof)
- iii. **Chromosome alterations:** Origin and meiotic behavior of deletions, duplications, translocations and inversions; variations in chromosome number, aneuploidy and polyploidy (types, origin and significance).
- iv. **Cell cycle:** Mitosis and Meiosis ó mechanism and significance

**UNIT: III**

- i. **RNA:** Structure, types and properties of RNA (mRNA, tRNA, rRNA), properties of genetic code, mechanism of transcription and translation (prokaryotes).
- ii. **Regulation of gene expression in prokaryotes** (Lac operon).
- iii. **Gene mutations:** Concept and types of point mutations, frame shift mutations ó concept and significance.

**UNIT: IV**

- i. **Mendelism;** Symbols and terminology, Mendel's laws of inheritance, Monohybrid, dihybrid and test crosses (suitable examples),
- ii. **Extensions of and deviations from Mendelian Principles:** (allelic and non-allelic interactions) ó incomplete dominance, Co-dominance, epistasis, complementary genes, duplicate genes and multiple alleles (with suitable examples in all).
- iii. **Linkage and crossing over:** Coupling and repulsion hypothesis, chromosome theory of linkage, mechanism of crossing over.

### **Laboratory Exercises:**

- i. To study cell structure from onion leaf peels; demonstration of staining and mounting methods.
- ii. Comparative study of cell structure in onion cells, *Hydrilla* and *Spirogyra*.
- iii. Study of cyclosis in *Hydrilla* staminal cells.
- iv. Study of plastids to examine pigment distribution in plants (*Lycopersicon* and *Capsicum*).
- v. Examination of electron micrographs of eukaryotic cells with special reference to organelles.
- vi. Study of electron micrographs of viruses, bacteria, cyanobacteria and eukaryotic cells for comparative cellular organization.
- vii. Examination of various stages of mitosis and meiosis using available plant material.
- viii. Demonstration of karyotypes from prepared slides and photomicrographs
- ix. Cytological examination of special types of chromosomes: bar bodies, lampbrush and polytene chromosomes from prepared slides.
- x. Working out the laws of inheritance (3:1; 9:3:3:1) and gene interaction (13:3; 9:7) using seed mixtures.

### **Suggested Readings:**

- Gupta, P. K. 2008. Cytology, Genetics and Evolution. Rastogi Publications, Meerut.
- Gupta, P. K. 2009. Genetics. Rastogi Publications, Meerut.
- Gupta, P. K. 2007. Cytogenetics. Rastogi Publications, Meerut.
- Starr, C., Taggart, R., Evers, C. and Starr, L. 2008. Cell Biology and Genetics. Brooks, Cole.
- Cooper G.M and Hausman R.E. 2007. The Cell A Molecular Approach Sinauer associate, Inc, Sunderland (USA).
- De Robertis and De Robertis. 2005. Cell and Molecular Biology, Lippincott Williams, Philadelphia. [B.I Publications Pvt. Ltd. New Delhi].
- Hartl, D.L. and Jones, E.W. 1998. Genetics: Principles and Analysis (4th edition). Jones & Bartlett Publishers, Massachusetts, USA.
- Strickberger 2005. Genetics. Prentice Hall of India Pvt. Ltd., New Delhi.