**HUMAN GENETICS Semester I (CBCS)**

**Core Course Title: Cell Biology and Genetics – I Code: DSC- HG-16-101**

**UNIT I CELL BIOLOGY**

* 1. Difference between Prokaryotic and Eukaryotic cell
	2. Chemical composition and structure of plasma membrane (Fluid Mosiac Model), Membrane Transport (Passive, Active, Bulk transport), Basis of membrane excitability
	3. Cell Organelles: Structure and function of Mitochondria, ER, Golgi bodies, Lysosomes,

 Microbodies, Centrioles, Cytoskeleton

* 1. Cell Reproduction: Cell cycle, Amitosis, Mitosis and Meiosis.

**UNIT II CYTOGENETICS**

2.1. Nuclear Structure- Structure and organisation of Chromatin (Nucleosome concept), Euchromatin and Heterochromatin,

2.2. Chromosome structure and karyotyping.

2.3. Variation in Chromosome- Structural and Morphological (Basic Concept)

2.4. Variation in Chromosome number: Euploidy and Aueuploidy. Origin/ Meiotic consequences.

**UNIT III MENDALIAN AND NON-MENDALIAN INHERITANCE**

3.1 Mendel's experiments: Law of segregation, Monohybrid cross, Law of independent Assortment

 (Dihybrid and Polyhybrid crosses), Dominance and Recessiveness.

3.2 Incomplete and co-dominance

3.3 Gene Interaction: Multiple allelism, epistatic and non-epistatic interaction, Peliotropy.

3.4 Lethal genes and their inheritance, Pedigree analysis.

 **UNIT IV LINKAGE AND SEX DETERMINATION**

4.1. Sex linked inheritance. Sex limited and sex influenced inheritance. Concept of bar body, Lyon hypothesis

4.2. Linkage and crossing over

4.3. Linkage Maps

4.4. Sex determination (Chromosomal, environmental and genetic basis)

**LABORATORY WORK**

1. Study of different stages of Mitosis from permanent slides
2. Prophase; Metaphase
3. Anaphase, Telophase
4. Cytokinesis
5. Study of different stages of Meiosis from permanent slides
6. Prophase I (leptone, zygotene, pachytene,diplotene, diakinesis)
7. Metaphase I;
8. Anaphase I; Telophase I
9. Prophase II; Metaphase II
10. Anaphase II; Telophase II
11. Ultra structure of Mitochondria and nucleus (Pictorial)
12. Study of karyotype from permanent slides.
13. Numericals based on Mendalian inheritance.
14. Human morphogenetic traits.
15. Pedigree analysis.

**Books Recommended**

1. Nelson, D.L. and Cox, M.M. Lehninger's Principles of Biochemistry. W.H. Freeman and Co., New York, 5th ed.
2. Voet, D., Voet, J.G. and Pratt, C.W. Fundamentals of Biochemistry: Life at the Molecular Level. John Wiley and Sons, New York
3. Biochemistry, Stryer
4. Molecular Biology of Cell, Bruce Alberts
5. Lodish et al: Molecular Cell Biology
6. Principles of Genetics , D. Peter Sinustad & Michael J Simmon ,Wiley & Sons, Inc
7. Gardner, E.J. Human Genetics. Viva Books Pvt. Ltd., India.
8. Klug, W.S. and Cummings, M.R. Concepts of Genetics. Pearson Education, Inc., New Delhi.
9. Snustad, D.P. and Simmons, M.J. Principles of Genetics. John Wiley and Sons, Inc., New York.
10. Strickberger, M.W. Genetics. Prentice-Hall India Pvt. Ltd., New Delhi
11. . Medical Genetics; Jorde, B; Carey, C; Bamshad; Elsevier Publication
12. Human Genetics; Lewis 11th Edition, McGraw Hill