CORE COURSE IV

GENETICS AND EVOLUTIONARY BIOLOGY

THEORY **(CREDITS 4)**

Unit 1

1.1 Mendalian genetics, Linkage, Linkage maps and crossing over
1.2 Nature of heterochromatin
1.3 Organisation of genetic material in prokaryotes and eukaryotes
1.4 Multiple alleles, Letahlity, Epistasis, Sex linked inheritance, extra chromosomal Inheritance

Unit 2

2.1 Mutations
Structural and numerical changes in chromosomes; Gene mutations
2.2 Replication
Replication in prokaryotes and eukaryotes
2.3 Transcription and translation
Transcription and post transcriptional modifications, translation
2.4 Sex Determination
Chromosomal mechanisms, dosage compensation

Unit 3

3.1 Introduction to Evolutionary Theories
Lamarckism, Darwinism, Neo-Darwinism
3.2 Evidences of Evolution
Types of fossils, Dating of fossils, Phylogeny of horse
3.3 Processes of Evolutionary Change
Organic variations; Isolating Mechanisms; Natural selection, Industrial melanism
3.4 Natural Selection
Directional, Stabilizing and Disruptive selection, Artificial selection

Unit 4

4.1 Species Concept
Biological species concept; Modes of speciation (Allopatric, Sympatric)
4.2 Macro-evolution
Macro-evolutionary Principles (example: Darwin's Finches)
4.3 Extinction
Mass extinction ,Causes and Role of extinction in evolution
4.4 Major extinctions
K-T extinction

GENETICS AND EVOLUTIONARY BIOLOGY

PRACTICAL **(CREDITS 2)**

1. Study of Human Karyotypes (normal and abnormal).

4. Study of fossil evidences from pictures

5. Study of homology and analogy from suitable specimens/ pictures

6. Charts:
   a) Phylogeny of horse with diagrams
   b) Darwin's Finches with diagrams/ cut outs of beaks of different species

7. Visit to Natural History Museum and to national parks within and outside state and submission of report

SUGGESTED READINGS

- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). *Principles of Genetics*. VIII Edition. Wiley India.

- Snustad, D.P., Simmons, M.J. (2009). *Principles of Genetics*. V Edition. John Wiley and Sons Inc.

- Gupta, P.K. *Genetics*

- Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing

- Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). *Evolution*. Cold Spring, Harbour Laboratory Press.

- Hall, B. K. and Hallgrimsson, B. (2008). *Evolution*. IV Edition. Jones and Bartlett Publishers

- Campbell, N. A. and Reece J. B. (2011). *Biology*. IX Edition, Pearson, Benjamin, Cummings.

- Douglas, J. Futuyma (1997). *Evolutionary Biology*. Sinauer Associates.