

Course Code	Course Name	Credits
26BY010	GENETICS AND EVOLUTION	04

Course Objectives

- Develop understanding of fundamental principles of genetics, Mendelian inheritance and deviations from Mendelian ratios.
- Explain chromosomal basis of inheritance, linkage, crossing over and extra-nuclear inheritance mechanisms.
- Gain knowledge of gene structure, mutation processes, mutagens and their evolutionary significance.
- Understand concepts, evidences and major theories of evolution in relation to biological diversity.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Describe Mendel's laws, solve monohybrid and dihybrid crosses, and interpret inheritance patterns.
- Explain chromosome theory of inheritance, linkage relationships, recombination and chromosomal variations.
- Discuss gene organization, operon concept, mutations and the role of mutagens in heredity and evolution.
- Evaluate evidences and theories of evolution.

Unit 1 - Mendelian genetics and Deviations (12 Hrs.)

Genetics and its significance, Mendel's experiments and Mendel's laws of inheritance, Monohybrid and dihybrid crosses, Incomplete dominance, Lethal alleles, Epistasis, Multiple alleles.

Unit 2 - Linkage and Chromosomal Basis of Inheritance (12 Hrs.)

Chromosome theory of inheritance, Concept of linkage, Crossing over and genetic recombination. Cytological basis of crossing over.

Unit 3 - Extra-Nuclear Inheritance and Chromosomal Variations (12 Hrs.)

Chloroplast inheritance, Mitochondrial inheritance, Structural changes in chromosomes, Numerical changes in chromosomes.

Unit 4 - Gene Structure and Mutation (12 Hrs.)

Concept of gene units – cistron, recon and muton, Genetic code and operon concept (basic idea), Gene mutations and mutagens: physical and chemical mutagen, Mutation rate and its significance.

Unit 5 - Evolution (12 Hrs.)

Concept and evidence of evolution, Theories of evolution: Lamarckism, Darwin's theory of natural selection and Modern Synthetic Theory of Evolution.

Reference Books:

1. Klug, W. S., Cummings, M. R., Spencer, C. A., & Palladino, M. A. (2018). Concepts of genetics. Pearson Education.
2. Ridley, M. (2004). Evolution. Blackwell Publishing.
3. Singh, B. D. (2023). Fundamentals of genetics (6th ed.). MedTech.
4. Snustad, D. P., & Simmons, M. J. (2016). Principles of genetics. Wiley.
5. Strickberger, M. W. (2000). Genetics. Prentice Hall of India.
6. Verma, P. S., & Agarwal, V. K. (1999). Concepts of evolution. S. Chand & Co.