

Programme	BS Chemistry	Course Code	BOT-118	Credit Hours	2
Course Title	Fundamentals of Genetics and Evolution (Theory)				
Introduction					
This course is designed to provide a comprehensive understanding of two foundational pillars of biology: genetics and evolutionary theory. This course includes concepts regarding inheritance patterns, recombination in bacteria, linkage and mapping, extranuclear inheritance, developmental and population genetics.					
Learning Outcomes					
On the completion of the course, the students will: To impart basic knowledge of genetics and how genes are carried from one generation to the next, and their subsequent impact on evolution To enable the students to understand the structural and functional basis of genes and proteins and their mutual interactions To enable the students to understand various DNA manipulations at the molecular level					
Course Contents					
Introduction, scope and brief history of genetics, Mendelian inheritance; Laws of segregation and independent assortment, Extension in Mendelian Inheritance, Dominance, incomplete dominance, and Co Dominance, Allozymes, and Isozymes, Back cross, test cross; Sex linked inheritance, Sex Linkage in Drosophila and Man (Color blindness), XO, XY, WZ mechanisms, Sex limited and sex-linked characters, Sex determination. Penetrance and Expressivity Allelic and Non-Allelic Interactions i.e. Epistasis, Pleiotropy Linkage and crossing over; Linkage groups, Construction of linkage maps, Detection of linkage. Recombination; DNA replication; Nature of gene, Transcription, Translation, Genetic code; Regulation of gene expression (e.g. lac operon). Transmission of genetic material in bacteria; conjugation and gene recombination in co-transduction and transformation The process and concept of evolution, theories of origin in life, Historic idea of evolution, sources of variability, different mechanisms of gene change, Evolutionary perspective explained by Hardy-Weinberg Equilibrium, Introduction to Quantitative Genetics, Evolution due to change in gene and Genotype frequencies, Role of gene mutation in evolution, Role of genetic drift and mutation in evolution Role of natural selection in evolution Role of Random mating and population size in evolution The Extranuclear Genome : Variegation in leaves of higher plants, mitochondrial genes in yeast, extra genomic plasmids in eukaryotes					
Teaching Learning Strategies					
Lectures Group Discussion Laboratory work Seminar/ Workshop Problems practice to clear genetics concepts					
Assignments: Types and Number with Calendar					
Students are expected to describe, apply and integrate the basic concepts of Genetics and Evolution, as well as Structure and Functions of different genes This will enable them qualify for basic to moderate level jobs involving general knowledge of Biology. The obtained knowledge shall also enable the students to enter into various entrepreneurial activities involving general introduction to Genetics.					