

Subject Code: 2SC1020401	Subject Title: Molecular Biology
COURSE TYPE: CORE COURSE	

Course Objective:

Molecular biology has been a subject that gives a lot of emphasis on the core and fundamental processes that are operated at the level of gene in unicellular and multicellular systems. Structures of DNA & RNA, Genetic Material, DNA Replication, Transcription and Translation are the processes that one needs to understand before going for advanced genetic techniques.

Teaching scheme (hours) per week		Credit			Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	Total	Uni. Assessment	Cont. Assessment	Uni. Assessment	Cont. Assessment	
3	--	3	--	3	70	30	--	--	100

Unit	Content	Lectures	Weightage
1	(A) Structures of DNA and RNA /Genetic Material - DNA Structure :Miescher to Watson and Crick-historic perspective - DNA structure, Salient features of double helix, Forms of DNA, Types of RNA - Experiments proving DNA as Genetic Material (B) Replication of DNA - Bidirectional and unidirectional replication, semi-conservative (Meselson and Stahl Experiment), semi-discontinuous replication - Mechanism of DNA replication :Enzymes and proteins involved in DNA replication–DNA polymerases, DNA ligase, primase, telomerase–for replication of linear end - Various models of DNA replication including rolling circle, θ (theta) mode of replication, Yoshikawa Model of DNA Replication	15	34%
2	Transcription - Transcription: Definition, - Promoter- concept and strength of promoter - RNA Polymerase and the transcription unit, general Transcription factors - Post-Transcriptional Processing - Split genes, concept of introns and exons, RNA splicing, spliceosome machinery, - Concept of alternative splicing, Poly adenylation and capping, Processing of rRNA, RNA interference :si RNA, mi RNA and its significance	15	33%
3	Translation Genetic Code - Translational machinery, Charging of t-RNA, aminoacyl t-RNA synthetases, Mechanisms of initiation, elongation, and termination of polypeptides in prokaryotes and eukaryotes. - Post Translational modification in protein - Antibiotics that affect the process of Translation in Prokaryotes	15	33%

Learning Outcome:

Students will learn the fundamental aspects of genetics at molecular level. Understanding Replication of DNA, synthesis of RNA and Proteins will be a cake walk by going through this course.

Reference Books:

1. Watson JD, Baker T A, Bell SP, Gann A, Levine M and Losic kR (2008) Molecular Biology of the Gene, 6th edition, Cold Spring Harbour Lab. Press, Pearson Publication
2. Lehninger
3. Becker WM, Kleinsmith LJ, Hardin J and Bertoni GP (2009) The World of the Cell, 7th edition, Pearson Benjamin Cummings Publishing, San Francisco
4. De Robertis EDP and DeRobertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott Williams and Wilkins, Philadelphia
5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc.
6. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory Press.
7. Krebs J, Goldstein E, Kilpatrick S (2013). Lewin's Essential Genes, 3rd Ed., Jones and Bartlett Learning
8. Gardner EJ, Simmons M J, Snustad DP (2008). Principles of Genetics. 8th Ed. Wiley-India