

OBJECTIVES: To enable the students

- To understand the organization and function of DNA and RNA at molecular level.
- To comprehend the concepts of gene expression and regulation of gene expression.
- To understand the molecular basis of mutations.

COURSE:

UNIT I: GENE & GENOME ORGANISATIONS

1. Identification of DNA and RNA as genetic material, Structure of DNA by Watson & Crick model
2. Organization of nuclear genome – genes and gene numbers; Satellite DNA Mitochondrial genome organization (Eg: Humans)
3. Chloroplast genome organization in plants.
4. Gene Families and clusters (Eg: Globin genes, histones).

UNIT II: REPLICATION OF DNA

1. DNA Replication – Models of DNA Replication semi-conservative, proof of semi-conservative replication.
2. Mechanism of DNA replication in Eukaryotes – linear method.
3. Enzymology of Replication (DNA Polmerase – I, II, & III, Helicases, Topoisomerases, Single strand binding proteins, DNA melting proteins, Primases).
4. Mechanism of DNA replication in prokaryotes
 - a. Rolling circle method
 - b. Theta mechanism
5. Gene mutation: Mutagenesis – Spontaneous and induced (Chemical & Physical) mutations, Natural and induction of mutations, point mutation, Frame-shift mutation, Auxotrophic conditional and suppressor mutations.
6. DNA damage & Repair: Light induced repair, Excision repair and Mis-match repair, Post replication repair, Rec-gene & its role in DNA repair, SOS repair and SOS response.

UNIT III: TRANSCRIPTION

1. Prokaryotic Transcription – Structure of prokaryotic RNA Polmerase (Core enzyme & Holo enzyme, sigma factor), Exons, Introns, Promoter (Pribnow box, - 10 & - 35 sequence), and terminators, Transcription process.
2. Eukaryotic transcription
3. Post – transcriptional modifications (capping, polyadenylaiton, splicing & alternate splicing)
4. Poly and mono cistronic mRNA
5. Reverse Transcription

UNIT IV: TRANSLATION

1. Genetic Code and its feature & Wobble Hypothesis. Structure of mRNA & tRNA.
2. Translation – Synthesis of polypeptides – Initiation, elongation and termination in prokaryotes.
3. Translation – Synthesis of polypeptides – initiation, elongation and termination in eukaryotes.

UNIT V: REGULATION OF GENE EXPRESSION

1. Regulation of gene expression in Prokaryotes; operon concept – Negative and Positive control of Lac – Operon, Trp – Operon, Control of gene expression.
2. Regulation of gene expression in Eukaryotes

REFERENCES

1. Cell and Molecular Biology by Robertis & Robertis, public. Waverly (2001) 8th Edition.
2. Molecular Biology of the Gene – By Watson, Hopkins, Goberts , Steitz & Weiner Public. Pearson Education (2002)
3. Principles of Gene Manipulation – By R.W. Old ANA S.B.Primson Public. Warosa 6th Edition (2003)
4. Molecular Biology & Biotechnology – By H.D. Kumar Public. Vikas (2005)
5. Cell Biology & Genetics by Varma & Agarwal (2008-2009) S.Chand Publications.
6. Genome 3 – T.A Brown .

OBJECTIVES: To enable the students to –

- I. Gain skills necessary for study of molecular biology.

COURSE:

- I: Isolation of RNA from yeast.
- II. Estimation of phosphorus.
- III: Isolation of chromosomal & plasmid DNA from bacteria.
- IV: Estimation of RNA by orcinol method.
- V: Estimation of DNA by Diphenyl amine method.

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