MOLECULAR GENETICS

Semester	Subject Code	Category	Lecture		Theory		P	C
III	21CABT3A	ALLIED – III	4 hrs per week	60	4 hrs per week	60	0	4

COURSE OBJECTIVE:

- To understand the genetic workflow and to provide information on gene expression and mutation.

COURSE OUTCOMES:

On the successful completion of the course,students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K4)
CO1	Identify and understand the molecular machinery of living cells and DNA repair mechanism.	K1, K2
CO2	Describe RNA structure and the concept of transcription.	K2
CO3	Discriminate the regulation of gene expression	K2
CO4	Evaluate the nature and action of mutations.	K4
CO5	Illustrate experimental designs related to molecular genetics	K3

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- analyze

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	S	S
CO2	S	S	S	M	M	M
CO3	M	S	S	S	M	M
CO4	M	M	S	M	S	S
CO5	M	M	S	M	S	S

S-Strong, M-Medium, L-Low

UNIT I: DNA STRUCTURE AND REPLICATION: 12 Hours

DNA Structure, Physical and chemical properties of DNA, Forms of DNA; DNA Replication – in prokaryotes and eukaryotes. Enzymology of DNA replication, semi conservative model of replication, rolling circle replication. DNA repair mechanism.

UNIT II: TRANSCRIPTION: 12 Hours

Transcription – Enzymatic Synthesis of RNA,Structure and function of different classes of RNA-coding(mRNA,tRNA and rRNA) and non-coding (small-miRNA,long-HOTAIR),RNA transport.Transcription in eukaryotes. Posttranscriptional modification (RNA capping, Poly A addition, Splicing).

UNITIII: GENE EXPRESSION AND REGULATION: 12 Hours

The genetic code. Protein synthesis (Initiation, Elongation, Termination) in prokaryotes and eukaryotes,Post translational modification. Gene expression and regulation : Principles of regulation- Lac Operon.

UNITIV: MUTATIONS 12 Hours

Spontaneous-transition,transversion,missense,nonsense,frameshiftmutations,Mutagens-Physical,Chemical and Biological mutagens. Cancer genetics-characteristic of cancer cell causes of cancer, oncogenes and tumor suppressor genes.

UNIT V: MOLECULAR GENETIC TOOLS: 12 Hours

DNArestrictionanalysis, Gel electrophoresis, southern, northern and western blotting. Nucleic acid hybridization,Polymerase chain reaction.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY

- Chalk and board
- Group discussion
- Assignments
- PPT presentations
- Seminars
- Models/Charts

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	David Freifelder	Molecular Biology	Jones and Bartlett	1998

2.	Harvey H. Lodish, Darnell J	Molecular Cell biology	W. H Freeman and Co.	2004
3.	Prakash.M	Molecular Genetics	Discovery Publishing House	2007
4.	Robert J Booker	Molecular Genetics	Scion Pub Limited	2007
5.	Strachan.T	Human Molecular Genetics	Garland Science	2007

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Watson,Baker,Bell,Levine	Molecular biology of gene	Pearson education	2010
2.	Gerald Karp	Cell and molecular biology	John Wiley and sons	2013
3.	Gardner	Principles of Genetics	John Wiley and sons	1991
4.	Tom Strachan	Human Molecular Genetics	Garland Science	1997
5.	Alfred Puhler	Advanced Molecular Genetics	Springer Science	1984

Web Sources:

1. https://www.youtube.com/watch?v=dKubyIRiN84
2. https://www.ncbi.nlm.nih.gov/books/NBK9851/
3. https://www.youtube.com/watch?v=2BwWavExcFI
4. https://www.youtube.com/watch?v=Avuj0q4mKa8
5. https://www.google.com/ www.biovision.com

Pedagogy:

- Chalk and board
- Group discussion
- Assignments
- PPT presentations
- Seminars
- Models/Charts

Syllabus Designer:

- Mrs. M.Malathi M.Sc., M.Phil
  Assistant Professor