

GENETICS AND MOLECULAR BIOLOGY

Sem	Sub. Code	Category	Lecture		Theory		Practical		Credit
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
V	21CBC5C	Core	4	60	4	60	-	-	4

COURSE OBJECTIVE:

To impart fundamental knowledge of basic genetics and molecular biology in understanding the molecular mechanism of gene function and mutational aspects.

COURSE OUTCOMES:

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

CO Number	CO Statement	Knowledge Level (K ₁ – K ₄)
CO1	Students will learn about the concepts of Mendelian genetics.	K2
CO2	Students will acquire knowledge on the role and the mechanism of DNA replication.	K2
CO3	Provides a clear knowledge on the RNA synthesis and its mechanism	K4
CO4	Provide an understanding of characteristic features of genetic code and protein synthesis Mechanism.	K4
CO5	Understand the major functional role of mutation, mechanism and its types	K1

(*CO – course Outcomes Knowledge Level: K₁ – Remember; K₂ – Understand; K₃ – Apply; K₄ – Analyze).

MAPPING WITH PROGRAMME OUTCOMES:

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

(S- Strong; M-Medium; L-Low)

Total Hours: 60

UNIT-I

Mendelian Genetics

10 Hours

Introduction – Birth of Genetics, Mendelian principles – Mendel's experimental organism. Mono hybrid cross–Principles of dominance and segregation. Di hybrid cross – Principles of Independent assortment. Chromosome Structure.

UNIT – II

DNA Replication

15 Hours

Evidences for DNA as genetic material: - Experimental proof for DNA replication in prokaryotes; Formation of DNA from nucleotides; Semi conservative mechanism and experimental proof; RNA priming; Bidirectional replication; theta mode, rolling circle model. Enzymology of DNA replication; Initiation, elongation and termination; Differences in eukaryotic replication; Inhibitors of replication [names only].

UNIT –III

Transcription

10 Hours

Prokaryotic transcription: - Central dogma; RNA polymerases; Initiation, elongation and termination of transcription. Role of eukaryotic RNA polymerases. RNA splicing and processing of mRNA, tRNA and rRNA. Reverse transcription.

UNIT – IV

Translation

15 Hours

Genetic code: - Experimental evidences; Features of genetic code. Composition of Prokaryotic ribosomes, tRNA - structure; activation of amino acids, coding and non - coding strands of DNA. Translation: - Initiation, elongation and termination of protein synthesis; inhibitors of protein synthesis. Post - Translational modifications of proteins.

UNIT – V

Mutation

10 Hours

Genome Mutations – change in structure of Chromosome, Changes in the number of Chromosomes, Gene Mutations – Spontaneous Mutation, induced Mutation, Point Mutation, Missense Mutation, Temperature Sensitive Mutation, Hot Spot.

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- Black Board
- Power Point Presentations
- Assignments
- Models
- Demonstrations

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
2.	Weaver, F., Robert, Hedrick, W. Philip,	Genetics	W.C. Brown Publishers	1997, 3rd ed.
3.	Lodish, Berk, Zipursky	Molecular Cell Biology	Baltimore, Freeman.	2007
4.	David Freifelder	Molecular Biology	Jones and Bartlett publishers	1993 2nd edition
5.	Gardner, Simmons	Principles of Genetics	Narosa Publishing House	8th edition, 1994.
6.	Karp, G.	Cell and Molecular Biology	John Wiley & Sons. Inc.	2010

REFERENCE BOOKS:

S. NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
6.	James.D.Watson	Molecular Biology of the Gene	Benjamin Cummings	2013
7.	Bruce Alberts and Dennis Bray	Essential Cell Biology	Garland Science	2013
8.	De Robertis, E.D.P. and De Robertis, E.M.F.	Cell and Molecular Biology	Lippincott Williams and Wilkins	2010

WEB SOURCES:

- www.slideshare.net/samiurrehmankhan/genetics-ppt-8948503
- www.slideshare.net/purakichha/dna-as-genetic-material
- www.slideshare.net/namarta28/dna-replication-11967263
- www.slideshare.net/joyjulie/transcription-14274749
- www.slideshare.net/joyjulie/transcription-14274749
- www.tavernarakislab.gr/publications/Chapter%2020.final.pdf
- www.boyertownasd.org/cms/lib07/PA01916192/Centricity/Domain/743/D.%20Chapter%207%20Lesson%204-Mutations.pdf

SYLLABUS DESIGNER:

- Dr.K. Shoba, Assistant Professor of Bio-Chemistry
- Dr.B. Hebsibah Elsie, Assistant Professor of Bio-Chemistry