

GENETICS

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
			Hrs/ week	Total Hours/ Semester	Hrs/ week	Total Hours/ Semester		
II	21CPZO2A	Core-IV	5	75	5	75	Nil	5

COURSE OBJECTIVES

- To understand the fine structure of genetic materials and regulation of their action. To know the chromosomal basis of genetic disorders, development and differentiation.
- To know the importance of population genetics and nuances of genetic engineering and applied genetics.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the fundamental aspects on structure of DNA and RNA and microbial genetics.	K2 & K3
CO2	To understand the concept of gene action, Operon concept and inborn errors of metabolism in man.	K2
CO3	To understand the human genetic disorders and to gain knowledge on genetic counseling.	K2
CO4	To know about the carcinogenesis, mutagens and the population genetics.	K4
CO5	To gain knowledge on genetic engineering and its applications in hospital with ethics.	K3 & K4

Knowledge Level : K1-Remember ; K2 –Understand ; K3 – Apply ; K4 – Analyze

MAPPING WITH PROGRAMME OUTCOME

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

S- Strong; M – Medium ; L- Low

DISTRIBUTION OF MARKS: THEORY 100%

UNIT-I

15 Hours

MOLECULAR STRUCTURE OF GENETIC MATERIAL

Molecular structure of DNA and RNA - Replication, theories, Gene concept - One gene one polypeptide concept. Chemical Nature of genetic material (DNA and RNA). Microbial Genetics - Conjugation, transformation and transduction and Sexduction. Chromosome mapping in prokaryotes (Virus, Bacteria) and eukaryotes (Neurospora and Man)

UNIT-II

15 Hours

REGULATION OF GENE ACTION

Enzyme regulation of gene action. Gene regulation of gene action - Operon concept - GAL and LAC Operon system. Evidence of regulation of gene action. Genes and metabolism. Inborn errors of metabolism in Man (With reference to protein, carbohydrates, Lipid and nucleic acid).

UNIT-III

15 Hours

CHROMOSOME AND GENETICS DISORDERS

Evolution of sex chromosomes. Dosage compensation - X inactivation. Genomic imprinting.

Human Genetics: Normal human karyotype - Variations in karyotypes (autosomal and sex chromosomal, structural and numerical) with special reference to classical syndromes in man. Principles and methods of pedigree analysis - statistical evaluation. Genetic counselling - Objectives, ethics and principles . Methods of counselling for point mutation, structural and chromosomal disorders.

UNIT-IV

15 Hours

GENES IN DEVELOPMENT, RADIATION GENETICS AND POPULATION GENETICS AND CYTOGENETICS

Genes in development and differentiation Mechanism of chromosomal breakage – physical, chemical and biological factors or agents. Mutagens, mutagenesis and carcinogenesis - genetic changes in Neoplasia in man.

Population genetics: Population and gene pool. Hardy Weinberg Law-Genetic equilibrium. Factors affecting Hardy Weinberg equilibrium.

Calculation of gene frequencies for Autosomal (Complete dominance, codominance and multiple alleles) and sex linked genes.

Cytogenetics-Structural and Numerical Changes in Chromosomes (Mutation-I and Mutation-II)

UNIT-V**15 Hours****GENETIC ENGINEERING AND APPLIED GENETICS**

Genetic Engineering - Restrictive enzymes - Recombinant DNA techniques. Applications of Recombinant DNA technology.

Applied Genetics - Application of genetics in animal breeding. Application of genetics in Crime and Law - DNA fingerprinting, Genetic basis of intelligence. Studies on Twins.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Daniel L. Hartl	Genetics	Jones and Barflaff Publishing, Boston.	1994
2.	Lewin, B.	Genes VII	Oxford University Press, New York.	2000
3.	Ayala, F. I. and Kieger, J.A. Jr.	Modern Genetics	The Benjamin Publishing Co. London,	1980
4.	Tamarin, R.H.	Principles of Genetics	WCB Publishers Munro	1996
5.	Market, C.L. & Ursprung,	Development Genetics	Prentice Hall.	1973

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Watson. J.D. Hopkins, N.H., Roberts, J.W., Steitz, J.A. and Weiner, A.M	Molecular Biology of the Gene. W.A.	Benjamin/Cummings Co., New York.	1987
2.	Sinnot. E.W., Dunn. L.C., Dobzhansky, T.H	Principles of Genetics	McGraw Hill Co., New Delhi.	1973
3.	Goodenough, U	Genetics	Saundes College Publishing Co., London	1984
4.	Jenking, J.B.	Human Genetics	The Benjamin Cummings Publishing & Co., London	1983
5.	Pandian, T.J. and Muthukrishnan, J	Research Methods for Gene and Chorosome Manipulation in Fish	Department of Biotechnology, Govt. of India, New Delhi	1990

WEB SOURCES:

www.sciencemag.com

www.treehugger.com

www.nature.com

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SYLLABUS DESIGNERS

- Dr D.Sasikala, Assistant Professor & HOD
- Dr.V.Kiruthiga, Assistant Professor
- Dr V.Rekha, Assistant Professor
- DrA.Vinodhini, Assistant Professor
- Dr.G.Vidhya, Assistant Professor
- Dr. S. Vijayakumari, Assistant Professor