

## GENETICS

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
			Hrs/ week	Total Hours/ Semester	Hrs/ week	Total Hours/ Semester		
IV	21CZO4A	Core	4	60	4	60	Nil	4

### COURSE OBJECTIVES:

- Students will understand causal relationships between molecule/cell level phenomena (modern genetics) and organism-level patterns of heredity (classical genetics).
- To learn some genetic studies in man and applied Genetics.

### COURSE OUTCOMES (CO)

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

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Students will be able to describe and apply the principles of Mendelian genetics and to identify the blood groups of Man	K2 , K3
CO2	Students can be able to differentiate the mutant forms from wild types.	K2, K3
CO3	Students will learn the principles of inheritance and identify the abnormalities of various syndromes.	K2, K3
CO4	Students will able to explain how mutation occur and its role in identifying genetic errors.	K3, K4
CO5	Students will be able to explain how genes are regulated	K3, K4

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

### MAPPING WITH PROGRAMME OUTCOMES

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

S- Strong; M–Medium; L-Low

Distribution of Marks: Theory 100% and Problems Nil %

## **UNIT I**

### **MENDELIAN GENETICS**

**(12 Hours)**

Introduction to Genetics - Basics of Mendelian inheritance- Mendelian Law of Dominance, Law of Segregation –Test cross and Back Cross - Interaction of Genes- Epistasis, Lethal genes, Atavism - Complementary Factors, Supplementary factors, Multiple Alleles - Blood Groups and their Inheritance in Human.

## **UNIT II**

### **LINKAGE and CROSSING OVER**

**(12 Hours)**

Linkage- Definition, Types of Linkage- Complete and Incomplete linkage, Linkage in Drosophila- Morgan's experiment. Importance of Drosophila in genetics – Culture methods - sex identification – Mutant forms of Drosophila (Vestigial wing, Ebony, White Eye, Yellow Body and Bar Eye). Crossing over -Types - Mechanism of Crossing over, Theories and significance of crossing over. Mapping of chromosomes.

## **UNIT III**

### **INHERITANCE**

**(12 Hours)**

Sex determination-(Barr bodies ,Chromosomal theory ,Hormonal theory) in Man , sex Linkage- Colour Blindness, Haemophilia, Hypertrichosis and Ichthyosis hystrix in Man, Sex Influenced genes-Baldness in Man and Index Finger and sex Limited Genes in Man. Non Disjunction (Klinefelter, Turner and Down syndromes), Gynandromorphs in Man – Normal and Abnormal Human Karyotype. Cytoplasmic inheritance- Kappa particles in Paramecium.

## **UNIT IV**

### **MUTATIONS**

**(12 Hours)**

Simple Mendelian Traits in Man- Sickle cell anemia, Inborn errors of Metabolism: Phenylketonuria –Alkaptonuria– Albinism. Pedigree Analysis, Eugenics, Euthenics, Genetic Counselling, Inbreeding and Out breeding, Heterosis. Chromosomal Aberrations- Euploidy, Aneuploidy, Monosomy, Trisomy, Gene Mutations– Physical and Chemical mutagens – DNA repair.

## **UNIT V:**

### **MODERN GENETICS**

**(12 Hours)**

Concept of Gene: Cistron, recon and Mutton – split gene – promoter – repetitive DNA – Transposons. Bacterial genome- Transformation – Conjugation – F factor -Sexduction – Transduction –Generalised and Specialised - Plasmids. Outline of Operon concept- Lac and trp operons. Population Genetics: Hardy Weinberg Law - Gene Frequency and the factors affecting it.

**TEXT BOOKS**

<b>S. No.</b>	<b>Author</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publications</b>
1	Meyyan RP	Fundamentals of Genetics	Saras Publication Nagercoil.	2015
2	Verma, P.S. and V.K. Agarwal	Genetics, 8th edition	S.Chand and Co, New Delhi – 110	1995
3	Primrose SB, Twyman R.	Principles of gene manipulation and genomics	John Wiley and Sons	2013

**REFERENCE BOOKS**

<b>S. No.</b>	<b>Authors</b>	<b>Title of the Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
1.	Gardner EJ	Principles of genetics	London, UK, John Wiley and Sons, Inc..	1995
2.	Goodenough	Genetics,	Holt, Rinehart and Winston; 2nd edition	1978
3.	Gunther S. Stent	Molecular Genetics	Macmillan Publishing Co Inc	1986
4.	Monroe. W. Strick Berger	Genetics	. Printice hall of India, New Delhi	2004.

**WEB SOURCES:**

[www.sciencedirect.co](http://www.sciencedirect.co).

[www.pebmed.com](http://www.pebmed.com)

[www.khansacademy.com](http://www.khansacademy.com)

[www.epatsala.com](http://www.epatsala.com)

[www.swayam.com](http://www.swayam.com)

**TEACHING METHODOLOGY**

- Class room teaching
- Charts/ Models
- Power point Presentations
- Discussions
- Assignments
- Home test

**SYLLABUS DESIGNERS**

Dr. D. Sasikala, Assistant Professor and HOD

Dr. V. Kiruthiga, Assistant Professor

Dr. V. Rekha, Assistant Professor

Dr. A. Vinodhini, Assistant Professor

Dr. G. Vidhya, Assistant Professor