



SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

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Department of Biotechnology		LP: BT18031
B.E/B. Tech/M.E/M.Tech : Biotechnology	Regulation: 2018A	Rev. No: 00
UG Specialisation : Biotechnology		Date: 02.07.2024
Sub. Code / Sub. Name : BT18031/ Genetics and Gene Therapy		
Unit : I		

Unit Syllabus: **LAWS OF INHERITANCE**

9

Laws of inheritance: Mendel's Laws, concept of dominance, segregation, independent assortment; Chromosome theory of inheritance

OBJECTIVE: To explain the laws of inheritance

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Laws of inheritance	R2 (103-108)	BB & LCD
2.	Experiments on inheritance	R2 (113-122)	BB & LCD
3.	Mendel's Laws – Independent assortment	T3 (06-15)	BB & LCD
4.	Mendel's Laws - segregation	T3 (06-15)	BB & LCD
5.	Concept of dominance	R2 (147-156)	BB & LCD
6.	Concept of segregation	T1 (80-82)	BB & LCD
7.	Concept of independent assortment	T1 (82-87)	BB & LCD
8.	Chromosome theory of inheritance – Gene location	T1 (37-38)	BB & LCD
9.	Chromosome theory of inheritance – Segregation	T1 (122-123)	BB & LCD
Content beyond syllabus covered (if any): --			

* Session duration: 50 minutes



Sub. Code / Sub. Name : BT18031/ Genetics and Gene Therapy
Unit : II

Unit Syllabus: ALLELES, ALLELISM AND EPISTASIS

9

Allelic and non-allelic interactions: Concept of alleles, types of dominance, lethal alleles, multiple alleles, test of allelism, complementation; Epistasis.

OBJECTIVE: To explain the role of alleles, allelism and epistasis

Session No *	Topics to be covered	Ref	Teaching Aids
10.	Concept of alleles	T3 (71)	BB & LCD
11.	Allelic and non-allelic interactions	T1 (561-562)	GCR / BB & LCD
12.	Allelic and non-allelic interactions	T1 (561-562)	BB & LCD
13.	Lethal alleles	T1 (112-113)	Blended Learning / Video lecture
14.	Multiple alleles	T1 (108-112)	BB & LCD
15.	Test of allelism	T1 (82-85)	GCR / BB & LCD
16.	Test of allelism	T1 (82-85)	BB & LCD
17.	Complementation	T1 (120-121)	BB & LCD
18.	Epistasis	T3 (65-70)	BB & LCD
Content beyond syllabus covered (if any): ---			

* Session duration: 50 mins



Sub. Code / Sub. Name : BT18031/ Genetics and Gene Therapy
Unit : III

Unit Syllabus: LINKAGE AND SEX LINKED INHERITANCE**9**

Linkage: Concepts, recombination, gene mapping in prokaryotes and eukaryotes, fine structure mapping. Sex-linked inheritance: Conceptual basis, sex influenced traits, mechanism of sex determination.

OBJECTIVE: To explain about the linkage and sex linked inheritance.

Session No *	Topics to be covered	Ref	Teaching Aids
19.	Linkage: Concepts	T1 (179-185)	BB&LCD
20.	Recombination	T1 (464-465)	Blended Learning / Video lecture
21.	Gene mapping in prokaryotes	T1 (415-416)	BB &LCD
22.	Gene mapping in eukaryotes	T1 (415-416)	GCR/BB &LCD
23.	Fine structure mapping	T1 (417-418)	BB & LCD
24.	Sex-linked inheritance - Cases	T3 (103-112)	BB & LCD
25.	Sex-linked inheritance: Conceptual basis	T3 (103-112)	BB & LCD
26.	Sex influenced traits	T3 (112-115)	BB & LCD
27.	mechanism of sex determination.	T3 (129-35)	BB & LCD
Content beyond syllabus covered (if any): --			

* Session duration: 50 mins



Sub. Code / Sub. Name : BT18031/ Genetics and Gene Therapy
Unit : IV

Unit Syllabus: QUANTITATIVE INHERITANCE AND PLOIDY**9**

Quantitative inheritance – Concept, Genes and Environment - heritability, penetrance and expressivity. Changes in Chromosome number and structure: Polyploidy, aneuploidy, chromosomal rearrangements - deletion, duplication, inversion, and translocation. Meiotic consequences in structural heterozygotes, role in speciation and evolution

OBJECTIVE: To explain about the quantitative inheritance and ploidy.

Session No *	Topics to be covered	Ref	Teaching Aids
28.	Quantitative inheritance – Concept	T1 (142-144)	BB & LCD
29.	Genes and Environment - heritability, penetrance and expressivity	T2 (415-418)	BB & LCD
30.	Genes and Environment - heritability, penetrance and expressivity	T2 (415-418)	BB & LCD
31.	Changes in Chromosome number and structure	T1 (219-242)	GCR/BB & LCD
32.	Polyploidy, aneuploidy	T1 (226-230)	BB & LCD
33.	Chromosomal rearrangements - deletion, duplication	T1 (231-234)	BB & LCD
34.	Chromosomal rearrangements - inversion, translocation	T1 (235-239)	GCR/BB & LCD
35.	Meiotic consequences in structural heterozygotes	T1 (239-240)	BB & LCD
36.	Role in speciation and evolution	T1 (241-242)	BB & LCD
Content beyond syllabus covered (if any): ---			

* Session duration: 50 mins



Sub. Code / Sub. Name : BT18031/ Genetics and Gene Therapy

Unit : V

Unit Syllabus: GENE KNOCKOUT, GENOME EDITING AND GENE THERAPY 9

Homologues recombination for gene knockout. RNAi system, Cre-LoxP and FIp-FRT systems. Engineered enzyme systems: Zinc finger nucleases (ZFNs), transcription-activator like effector nucleases (TALEN), meganucleases and the clustered regularly interspaced short palindromic repeats (CRISPR/Cas9) system. Design of sgRNA. Multiplex Automated Genomic Engineering (MAGE). Viral vectors in gene therapy, Gene therapy case study and applications

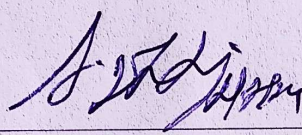
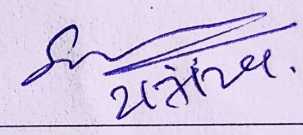
OBJECTIVE: To explain about the genome editing and gene therapy

Session No *	Topics to be covered	Ref	Teaching Aids
37.	Homologues recombination for gene knockout	R2 (687-688)	BB & LCD
38.	RNAi system	T1 (269-277)	GCR/BB & LCD
39.	Cre-LoxP and FIp-FRT systems	Lecture material	BB & LCD
40.	Engineered enzyme systems: Zinc finger nucleases (ZFNs)	Lecture material	BB & LCD
41.	Transcription-activator like effector nucleases (TALEN)	Lecture material	BB & LCD
42.	Meganucleases and the clustered regularly interspaced short palindromic repeats (CRISPR/Cas9) system.	Lecture material	BB & LCD
43.	Design of sgRNA	T1 (347-348)	BB & LCD
44.	Multiplex Automated Genomic Engineering (MAGE)	Lecture material	BB & LCD
45.	Viral vectors in gene therapy, Gene therapy case study and applications	T3 (545-546)	BB & LCD
Content beyond syllabus covered (if any): --			

* Session duration: 50 mins



TEXT BOOKS:	
1.	Klug W. S. and Cummings M. R, "Concepts of Genetics", 12 th Edition, Prentice Hall, 2019.
2.	Benjamin A Pierce, "Genetics-a Conceptual Approach", 7 th Edition, W H Freeman & Company, 2019
3.	A. V. S. S. Sambamurthy, Genetics, 2 nd edition, Alpha Science International Ltd, 2005
REFERENCES:	
1.	Griffith A. F. et al, "An Introduction to Genetic Analysis", 11 th Edition, W H Freeman & Company, 2015
2.	Monroe W. Strickberger, Genetics, 3 rd edition, Pearson ltd, 2002

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Date	02.07.2024	02.07.2024
Remarks *:	--	
Remarks *:	--	

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD