



SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Page 1 of 6

DEPARTMENT OF BIOTECHNOLOGY		
B.E/B.Tech/M.E/M.Tech : B.Tech - Biotechnology		LP: BT22404
Regulation	: 2022	Rev. No: 00
PG Specialisation	: NA	Date:
Sub. Code / Sub. Name	: BT22043 / HUMAN GENETICS	20/01/2025
Unit	: 1	

Unit Syllabus: Introduction to Human Genetics and Genome Organization 9h

Classical & Modern Genetics - Human chromosome structure and organization - DNA Structure and Replication mechanism, Mitochondrial genome organization - coding and non-coding genes- gene arrangements - regulatory RNAs-epigenetic regulation.

Objective: Describe the structure and organization of the human genome.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Classical & Modern Genetics	TB3 (1-2)	GCR / Videos / LCD
2.	Human Chromosome Structure and Organization	TB3 (2-5)	GCR / Videos / LCD
3.	DNA Structure	TB3 (11)	GCR / Videos / LCD
4.	Replication Mechanism	TB3 (6-7)	GCR / Videos / LCD
5.	Mitochondrial Genome Organization	TB3 (7)	GCR / Videos / LCD
6.	Coding and Non-Coding Genes	TB3 (7-10)	GCR / Videos / LCD
7.	Gene Arrangements	TB3 (18-19)	GCR / Videos / LCD
8.	Regulatory RNAs	TB1 (18-20) RB2 (6-8)	GCR / Videos / LCD
9.	Epigenetic Regulation	TB2 (19-24) RB1 (7-11)	GCR / Videos / LCD

Content beyond syllabus covered (if any): NIL

* Session duration: 50 minutes



Sub. Code / Sub. Name : **BT22043 / HUMAN GENETICS**

Unit : 2

Unit Syllabus: Understanding of Inheritance in Humans

9h

Types of inheritance - Mendelian inheritance and, deviations of Mendelian Inheritance - mitochondrial inheritance - Mendelian pedigree patterns & Pedigree analysis, Quantitative traits, Polygenic inheritance, Gene and genotype frequencies.

Objective: Explore patterns of inheritance in humans.

Session No *	Topics to be covered	Ref	Teaching Aids
10.	Epistasis	TB1 (7-9) RB1 (11-14)	GCR / Videos / LCD
11.	Mendelian Inheritance	TB1 (11-13) RB1 (16-19)	GCR / Videos / LCD
12.	Deviations of Mendelian Inheritance	TB3 (16-17)	GCR / Videos / LCD
13.	Mitochondrial Inheritance	TB3 (18-19)	GCR / Videos / LCD
14.	Mendelian Pedigree Patterns	TB1 (20-24) RB2 (8-12)	GCR / Videos / LCD
15.	Pedigree Analysis	TB2 (28-30) RB1 (11-14)	GCR / Videos / LCD
16.	Quantitative Traits	TB2 (44-46) RB2 (32-38)	GCR / Videos / LCD
17.	Polygenic Inheritance	TB2 (81-84) RB1 (69-72)	GCR / Videos / LCD
18.	Gene and Genotype Frequencies	TB2 (101-104) RB2 (121-124)	GCR / Videos / LCD
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins



Sub. Code / Sub. Name : **BT22043 / HUMAN GENETICS**

Unit : 3

Unit Syllabus: Chromosomal Abnormalities in Humans

9h

Numerical chromosome abnormalities and causative mechanisms - Aneuploidy & polyploidy - Structural chromosome abnormalities and causative mechanisms - Mixoploidy, X-inactivation, Mosaicism due to X-inactivation - Karyotyping, Fluorescent in situ hybridization techniques.

Objective: Evaluate karyotyping techniques for analyzing chromosomal aberrations in humans.

Session No *	Topics to be covered	Ref	Teaching Aids
19.	Numerical Chromosome Abnormalities and Causative Mechanisms	TB3 (107-110) RB2 (44-46)	GCR / Videos / LCD
20.	Aneuploidy	TB3 (111-115) RB2 (47-48)	GCR / Videos / LCD
21.	Polyploidy	TB3 (116-117) RB2 (48-49)	GCR / Videos / LCD
22.	Structural Chromosome Abnormalities and Causative Mechanisms	TB3 (107-110) RB2 (50-51)	GCR / Videos / LCD
23.	Mixoploidy	TB3 (111-114) RB2 (51-53)	GCR / Videos / LCD
24.	X-Inactivation	TB3 (114-115) RB2 (53-55)	GCR / Videos / LCD
25.	Mosaicism Due to X-Inactivation	TB3 (115-117) RB2 (56-58)	GCR / Videos / LCD
26.	Karyotyping	TB3 (114-119) RB2 (59-60)	GCR / Videos / LCD
27.	Fluorescent In Situ Hybridization Techniques	TB3 (120) RB2 (60-61)	GCR / Videos / LCD
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins



Sub. Code / Sub. Name : **BT22043 / HUMAN GENETICS**

Unit : 4

Unit Syllabus: Diagnosis of Genetic Diseases in Humans

9h

Genetic testing single gene and whole genome, e.g.: Sickle cell anemia, Exome Sequencing- Genome Wide Association Studies - Biochemical tests and gene expression analyses, Prenatal and neonatal genetic testing.

Objective: Discuss methods for detecting genetic variations in human populations and for prenatal diagnosis.

Session No *	Topics to be covered	Ref	Teaching Aids
28.	Genetic Testing: Single Gene and Whole Genome	TB3 (14-18)	GCR / Videos / LCD
29.	Example: Sickle Cell Anemia	TB3 (18-19) RB2 (65)	GCR / Videos / LCD
30.	Exome Sequencing	TB3 (20-24) RB2 (66-67)	GCR / Videos / LCD
31.	Genome Wide Association Studies (GWAS)	TB3 (25-27) RB2 (68)	GCR / Videos / LCD
32.	Biochemical Tests	TB3 (28-32)	GCR / Videos / LCD
33.	Gene Expression Analyses	TB3 (33-37) RB2 (72-74)	GCR / Videos / LCD
34.	Prenatal Genetic Testing	TB3 (37-39) RB2 (75)	GCR / Videos / LCD
35.	Neonatal Genetic Testing	TB3 (40-47)	GCR / Videos / LCD
36.	Applications and Implications of Genetic Testing	TB3 (47-49) RB2 (76-77)	GCR / Videos / LCD
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins



Sub. Code / Sub. Name : **BT22043 / HUMAN GENETICS**

Unit : 5

Unit Syllabus: Applications of Human Genetics

9h

Applications of Human genetics - personalized medicine- pharmacogenetics - forensic analysis - pedigree construction and analysis - genetic counseling - importance of genetic counseling - Ethical & legal implications of human genetics research.

Objective: Apply knowledge of human genetics to address real-life problems.

Session No *	Topics to be covered	Ref	Teaching Aids
37.	Applications of Human Genetics	TB3 (16-19) RB2 (21-27)	GCR / Videos / LCD
38.	Personalized Medicine	TB3 (21-27) RB2 (30-33)	GCR / Videos / LCD
39.	Pharmacogenetics	TB3 (111-120) RB2 (35-38)	GCR / Videos / LCD
40.	Forensic Analysis	TB3 (121-124) RB2 (29-41)	GCR / Videos / LCD
41.	Pedigree Construction and Analysis	TB3 (121-125) RB2 (42-44)	GCR / Videos / LCD
42.	Genetic Counseling	TB3 (114-119)	GCR / Videos / LCD
43.	Importance of Genetic Counseling	TB3 (128-131) RB2 (42-47)	GCR / Videos / LCD
44.	Ethical Implications of Human Genetics Research	TB1 (121-125) RB2 (47-49)	GCR / Videos / LCD
45.	Legal Implications of Human Genetics Research	TB2 (119-121)	GCR / Videos / LCD

Content beyond syllabus covered (if any): NIL

* Session duration: 50 mins



Sub. Code / Sub. Name : **BT22043 / HUMAN GENETICS**

REFERENCES:

Text Books:



1. Griffiths A.J.F., Wessler S.R., Carroll S.B., Doebley J. Introduction to Genetic Analysis. 12th Edition, W.H. Freeman & Company, 2014.
2. Korf B.R., Irons M.B. Human Genetics and Genomics. 5th Edition, Elsevier, 2018.
3. Pritchard D.J., Korf B.R. Medical Genetics at a Glance. 3rd Edition, Wiley Blackwell, 2013.

Reference Books:

1. Turnpenny P.D., Ellard S. Emery's Elements of Medical Genetics. 15th Edition, Elsevier, 2019.
2. Strachan T., Read A.P. Human Molecular Genetics. 5th Edition, Garland Science, 2010.
3. Moyers J.S., Speicher M.R. Genetics in Medicine. 8th Edition, Saunders, 2013.

YouTube Video:

1. https://www.youtube.com/playlist?list=PLvDocy_6Jwl_vQMw0yBs7BOIf7sbXJyOb

	Prepared by	Approved by
Signature		
Name	Dr. Aswin Jen J G	Prof. E. Nakkeeran
Designation	Assistant Professor	Head - Biotechnology
Date	20/01/2025	20/01/2025

Remarks: The same lesson plan will be followed in the subsequent semester.