

16BT205 GENETICS

Hours Per Week :

| L | T | P | C |
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| 3 | 1 | - | 4 |

Source:
www.sparticl.org

Course Description and Objectives:

The course introduces basic principles of Mendelian laws of Genetics and organization of genetic material. It also describes fine structure and function of chromosomes. The objective of this course is to provide insight into Laws of inheritance, chromosomes, genetic aberrations, genetic linkage and extra-chromosomal inheritance.

Course Outcomes:

Upon completion of the course, the student will be able to

- CO1: Accomplish the genetic basis of heredity by linkage mapping.
- CO2: Attain knowledge on organization and packing of chromosome and its functions.
- CO3: Enable to understand the structure of DNA, mutations and cloning strategy.
- CO4: Enable to understand the detail structure of Phages and its mechanism of infection.
- CO5: Comprehend the basics of population genetics and epigenetics.

SKILLS:

- ✓ *Solve genetics problems related to Mendelian Laws of inheritance.*
- ✓ *Disease mapping by pedigree.*
- ✓ *Karyotype human chromosome.*
- ✓ *Map chromosome.*

UNIT - 1

L-9, T-3

PHYSICAL BASIS OF HEREDITY: Historical perspectives of genetics; Mendelian laws/Basic laws of inheritance- monohybrid, dihybrid and trihybrid cross; Modification of Mendel's ratios due to gene interactions; Multiple alleles and lethality; Multiple factors of inheritance; The concept of linkage, crossing over and recombination; Two point, three-point test crosses and gene mapping; Probability in Mendelian inheritance.

UNIT - 2

L-9, T-3

GENETIC MATERIAL AND ITS ORGANIZATION: Identification of the genetic material; Classical experiments- Hershey-Chase, Avery–MacLeod–McCarty and Meselson-Stahl. Packing and organization of genetic material in prokaryotes and eukaryotes; Chromosome morphology, classification and karyotyping; Special chromosomes.

UNIT - 3

L-9, T-3

BACTERIAL GENETICS AND EXTRA CHROMOSOMAL INHERITANCE: Conjugation, transformation and transduction; Phages and their life cycles; Retroviruses; Introduction to extra chromosomal inheritance with examples; Petite phenotypes in yeast; Uniparental inheritance in algae.

UNIT - 4

L-9, T-3

GENE STRUCTURE AND MUTATIONS: Spontaneous and induced mutations; Selection of mutants- Ames test; Chromosomal aberrations; Fine structure of genes in prokaryotes and eukaryotes; Genetic control of development in *Drosophila*.

UNIT - 5

L-9, T-3

CONCEPTS OF HUMAN GENETICS (SEX DETERMINATION, LINKAGE AND DOMINANCE): Introduction - population genetics, eugenics and eugenics; Mechanisms of sex determination and differentiation; Sex influenced dominance; Sex linked inheritance and sex limited gene expression; Molecular basis of genetic diseases and applications.

TEXT BOOKS:

1. P.K. Gupta, "Genetics", 3rd edition, Rastogi Publications, 2005.
2. E. J. Gardner, M.J. Simmons and D. P. Snustad, "Principles of Genetics", 8th edition, Wiley India, 2007.

REFERENCE BOOKS:

1. M.W. Strickberger, "Genetics", 3rd edition, Prentice Hall of India Publications, 2006.
2. W. H. Elliott and D.C. Elliot, "Biochemistry and Molecular Biology", 3rd edition, Oxford University Press, 2007.

ACTIVITIES:

- *Examine Mendelian Laws using pea plant by applying Punnett squares.*
- *Design Ames test to understand mutation.*
- *Solve the crossover problems using *Drosophila* as an example.*
- *Conduct conjugation experiment using *E. coli* model.*