

General Genetics

Semester No	Code	Credit Hours
3/8	BIT-116	2-1

Course description:

Genetics is a course designed for biology majors and to present the basic concepts of genetics. The course will emphasize basic Mendelian genetic principles, the molecular basis of heredity, the mechanism and regulation of gene expression and recombinant DNA technology.

Recommended Books:

1. **Genetics** by Klug and Cummings; 8th edition.
2. **Genomes 3** by T. S. Brown: Garland Science; New York
3. **An Introduction to Human Molecular Genetics; Mechanisms of Inherited Diseases** by Jack J. Pasternak; Wiley-Liss A John Wiley and sons. Inc., Publication.
4. **Human Molecular Genetics 3** by Tom Strachan and Andrew P. Read: Garland Science; New York

Prerequisite:

None

Course Learning Outcomes:

After completion of this course you should be able to use the principles of Mendelian genetics to predict the progeny of crosses of known genotypes. They would be able to deduce parental genotypes based upon progeny ratios and use a pedigree and the laws of inheritance to calculate the risk of affected children in a specific mating.

Assessment system:

Quizzes	10-15%
Assignments	5-10%
MSE	30-40%
ESE	40-50%

Week wise Lecture Plan:

Week	Lecture Topic
1	Introduction, scope and brief history of genetics.
2	Mendelian inheritance; Laws of segregation and independent assortment, back cross, test cross, dominance and incomplete dominance.
3	Sex linked inheritance, sex linkage in Drosophila and man, XO, XY, WZ mechanism, sex limited and sex linked characters, sex determination.
4	Gene Mapping
5	Pedigree analysis
6	Mutations
7	Mechanisms of Gene Mutation
8	Chromosomal aberrations: Changes in the number of chromosomes. Aneuploidy and euploidy. Changes in the structure of chromosomes, deficiency, duplication, inversion and translocation.
9	MIDTERMS
10	Molecular genetics: DNA replication. Nature of gene, genetic code, transcription, translation, protein synthesis, regulation of gene expression (e.g. lac operon). Transmission of genetic material in Bacteria:
11	-do-
12	Conjugation and gene recombination in <i>E.coli</i> , transduction and transformation. Principles of genetic engineering/biotechnology;
13	-do-
14	Basic genetic engineering techniques. Application of genetics in plant improvement: Induction of genetic variability (gene mutation, recombination), physical and chemical mutagens.
15	-do-
16	Population Genetics
17	-do-
18	END SEMESTER EXAMINATION

Lab Number	Equipment	Experiment Detail
1-2	Pedigree analysis	Pedigree analysis
3-4	Pedigree analysis	Genetical problems related to transmission and distribution of genetic material.
5-6	Microscope	Study of salivary gland chromosomes of Drosophila.
7-8	Microscope	Study of Human Chromosomes.
9-10	chemicals	DNA Extraction
11-12	Electrophoresis apparatus, power supply	Gel Electrophoresis
13-14	Chemicals, microscope, dyes	Karyotyping
		Lab Exam