ZOH501- GENETICS AND QUANTITATIVE BIOLOGY

Teaching Hours 10 /Unit

COURSE OUTCOME

1. The course is mainly focused on principles of classical genetics, environmental and genetic influences on expression of traits.
2. Both animal and human models are used to explain the phenomenon. Structural and functional components of genes are also studied.
3. Consequences of gene modifications and the possible mechanism of its repair, genetic control in the development of adult characters are also dealt.
4. Genetic disorders prevailing in human population, their chances of inheritance, genetic methods of screening and preventive measures are included.
5. Pupil are trained in various statistical tools commonly used are also included in understanding and interpreting the probable chances of genetic pattern of inheritance of human traits.
6. In the biological research fields, statistical analysis plays an essential role in concluding data and postulating different hypothesis. So Biostatistics is an essential subject for those who go for a research carrier.

UNIT I

Historical highlights - Development of the gene concept. Elements of heredity and variation. Mendelian Genetics - Mendelian principles; Mendelian inheritance and probability. Modified genetic ratios – Co-dominance – incomplete dominance – Lethal alleles, Interaction between different genes – Duplicate genes, Complementary genes, penetrance and expressivity, pleiotropy, Epistasis, Extra chromosomal inheritance. Sex determination – sex linked inheritance in Drosophila and man, sex limited and sex influenced traits. Multiple alleles – Genetics of Blood group inheritance.

UNIT II

Genetic code, molecular structure of gene, transposable elements, gene mutations and DNA repair. Regulation of gene expression in prokaryotes and eukaryotes, Operon concept, attenuation and anti-termination, Giant chromosomes, Environmental regulation of gene expression. Linkage, recombination and gene mapping: Linkage groups, complete and partial linkage. Construction of linkage maps in Drosophila,

Genetic basis of development in Drosophila- Genes involved in Drosophila development and their functional role.

UNIT III

Human karyotype; International System for Human cytogenetic Nomenclature (ISCN) , Chromosome aberrations- structural and numerical variations- Chromosomal syndromes; Human genome project; Genetic counselling ; Genetic Screening- Amniocentesis, Chorionic Villus Sampling, Cardiocentesis; Dermatoglyphics.

UNIT IV

Genome imprinting ; Genetics of behaviour- twins in genetic Studies; Pedigree analysis ; Inheritance of Autosomal and sex chromosomal traits ; Multi- factorial and polygenic Inheritance ; Population genetics-Hardy Weinberg law; Factors changing allelic frequencies – Mutation, Selection, Genetic drift, Migration. Meiotic drive.

UNIT V

Population and sample- Sampling techniques ; Organization of biological data –Tabular and Graphical Methods ; Analysis of data – Measures of central tendency(Mean, Median, Mode) Standard deviation ; Probability & Frequency distribution –Normal, Binomial and Poisson distributions ; Correlation and regression ; Chi-Square test; Test of significance , t –test, Analysis of Variance(ANOVA).

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