DISCIPLINE SPECIFIC ELECTIVE–(DSE) Genetics of Health and Disease

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title and Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE – Genetics of Health and Disease	**4**	**3**	**0**	**1**	**Class XII pass**	**Studied Human Population Genetics**

Course Objectives

- To understand the basic tenets of genetics of health and disease
- To understand various methodologies for the identification of genetic variation.
- To understand the role of large-scale genetic investigations in determining the diverse genetic make-up of human population groups.

Learning Outcomes

Students will be able to learn:

- The historical transition and continuities of genetic health research and how genetic research contributes to health and disease.
- The classical and modern approaches in conducting genetic epidemiological studies.
- Different types of mega data projects and ethical considerations while implementing the findings of genetics research

Unit 1: Introduction **11 Hours**

Introduction, scope and strategies of genetic epidemiology in 21st century. Databases in Human genetics or genetic epidemiology. Concept of heritability, Linkage, LOD score, Linkage disequilibrium and Twin studies and Family based genetic studies

Unit 2: Genetic Association Studies **11 Hours**

Genotype-phenotype correlation, Genetic association studies: Candidate gene approach, Genome-wide association studies, Whole genome association study. Genetics of biomedical and behavioral traits

Unit 3: Genetic Projects **11 Hours**

Overview of HapMap Project, 1000 Genome Project, UK Biobank, Genome India Project, Human Population Structure, Ethical considerations

Unit 4: Applied Aspects **12 Hours**

Epigeneomics, Epigenetic markers, Gene-environment interaction in health and disease. X-inactivation, imprinting, and epigenetic memory. Multifactorial inheritance of common traits and diseases, Behavioral genetics. Pharmacogenetics, Personalized medicine, Genetic counselling and pre-natal diagnosis, Cancer genetics

Practical: **30 Hours**

1. DNA Extraction
2. DNA Amplification: Polymerase chain reaction [PCR]
3. DNA Quantification
4. Genotyping

Core Readings

1. Vogel and Moulusky (2010). *Human Genetics*. Springer
2. Khoury M, Bedrosian S, Gwinn M, Higgins J, Ioannidis J, Little J (2010). *Human Genome Epidemiology.* Oxford University Press.

Suggested Readings

1. Gustafson JP, Tayler J, Stacey G (2008). *Genomics of Disease*. Springer
2. Timothy J.A. Chico (Eds.) (2014). *Genetics of Cardiovascular Disease* [1 ed.]. Academic Press.

Examination and Assessment

Examination and assessment will be carried out as per the University of Delhi guidelines and notifications issued from time to time.