CBCC offered by Department of Genetics.

Human Genetics: Concepts and Paradigms

1. Traits of interest

Inheritance pattern of Mendelian and complex trait: pigmentation, intelligence and creativity as models of complex trait; Microbiota shaping human traits.

2. Clinical Genetics and Genetic disorders

a) Concept of mutation and polymorphism

b) Single gene vs complex disorder: Cystic Fibrosis, Beta-thalassemia, ADHD, Haemophilia as models

c) Gene-environment interplay in diseases: cancer as model

d) Genetic variations and susceptibility of horizontal disease: Malaria as a case study.

3. Population Genetics and Evolution

a) Concepts of allele frequency, genotype frequency, HW equilibrium and genetic drift;

b) Human migration and 'Out of Africa' hypothesis and evolution of *Homo sapiens*.

4. Immunogenetics and Network Ecology

Evolution of genes involved in immune response to parasites; Genetics of diseases resistance.

5. Pharmacogenetics

Concept of personalized medicine.

6. Tools in human genetic research

a) PCR-sequencing based screening of disease genes; association study; Microarray analysis; b) Gene therapy, gene editing and gene replacement therapy;

c) Study of database in relation to human disorders: OMIM as a model.

7. Genetics and Society

a) Genetic counseling and risk assessment; Carrier detection

b) IVF and stem cell genetics

c) Forensic studies and paternity testing; Cord blood banking, New born screening in genetic disorders.

8. Community Genetics and legal issues

Ethics in genetic research; Case studies.

9. Genetic models of human diseases

Disease Models in *Drosophila melanogaster* and the role of the fly in therapeutic drug discovery; Humanized mice; Canine model of eye disorders].

10. Epigenetics

Methylation and histone modification in causation of disorders; Inheritance of fear as a case study.