

Undergraduate Program in Anthropology

Anthropological Genetics

Semester III

Paper 5

Marks: 150 (Theory = 75; Internal Assessment = 25; Practical / Project = 50)

Theory

Unit I: Essentials of Genetics

1. Landmarks in the history of genetics
2. Mendel's principles of inheritance
3. Sex linked genes
4. Principles in human genetics
5. Extension of Mendel's principles
6. Complex inheritance

Unit II: The Chromosomal Basis of Inheritance

1. Chromosomes and the chromosome theory of inheritance
2. Chromosomal karyotyping
3. Sex determination and dosage compensation

Unit III: Anthropological Genetics

1. Meaning and scope
2. Short history of human population genetics

Unit IV: Hardy-Weinberg Principle

1. Genotype and allele frequencies
2. Hardy-Weinberg equilibrium and a simple proof
3. Applications of Hardy-Weinberg principle and its exceptions

Unit V: Dynamics of Change in Gene Frequency

1. Mutation
2. Selection
3. Genetic drift
4. Gene flow/migration
5. Inbreeding

Unit VI: Genetic Polymorphism

1. Balanced and transient polymorphism
2. Tools for studying polymorphism
3. Methods of studying genetic variation
4. Utility of genetic markers in forensic, population and disease association studies.
5. Analysis of quantitative traits and complex pattern of inheritance

Practical

1. A1, A2, B, O and MN blood groups
2. Rh (D) typing
3. Color Blindness
4. PTC tasting ability
5. Biochemical markers

Readings

1. Brooker R.J. (2012). *Genetics: analysis & principles*. The McGraw-Hill Companies, Inc 4th ed.
2. Cavalli-Sforza, L.L. and Bodmer, W.F (1971). *The Genetics of Human Population*. San Francisco: Freeman [VI (Chapter-4)]
3. Cooper D.N. and Kehrer-Sawatzki H. (2008). *Handbook of Human Molecular Evolution*. John Wiley & Sons, volume-2.
4. Crawford M.H. (2007). *Anthropological Genetics Theory, Methods and Applications*. Cambridge University Press [Unit-III (Chapter-1,2,3,4 and 16)]
5. Cummings M.R. (2011). *Human Heredity: Principles and Issues*. Ninth Edition. Brooks/Cole, Cengage Learning
6. Jobling, M.A. Hurlst M. and Tyler-Smith C. (2004). *Human Evolutionary Genetics: Origins, Peoples & Disease*. GS. NY [Unit-VI (Chapter- 4 and 15)]
7. Lewis R. (2009). *Human Genetics: Concepts and Applications* 9th Edition. The McGraw–Hill Companies, Inc.
8. Patch C. (2005). *Applied Genetics in Healthcare*. Taylor & Francis Group

9. Relethford J.H. (2012). *Human Population Genetics*. Wiley-Blackwell, USA [**Unit-III** (Chapter-1 and 9), **Unit IV** (Chapter-2), **Unit V** (Chapter: 3-8)]
10. Snustad .D.P. and Simmons M.J. (2006). *Principles of Genetics*, Fourth Edition, John Wiley & Sons USA, Hoboken NJ [**Unit I** (Page: 85-101; 1-32), **Unit II** (Page: 85-101), **Unit IV** (Page: 737-754), **Unit V** (Page-737-754)]
11. Strachan T, Read A.P. (2004). *Human Molecular Genetics*. Garland Science/Taylor & Francis Group.
12. Vogel F. and Motulsky A.G. (1996). *Human Genetics*. Springer, 3rd revised edition. [**Unit-1** (Page: 1-23; 129-139; 163-176; 205-207; 119-122-145-147), **Unit II** (Page: 44-79; 659-666), **Unit IV** (Page-147-152), **Unit V** (Page: 385-426; 508-545; 549-580), **Unit VI** (Page: 195-256)]