

# FACULTY OF LIFE SCIENCES

## Syllabus

For

## Interdisciplinary Course in Human Genetics (PG)

Examinations: 2019–20



---

# Guru Nanak Dev University Amritsar

---

- Note: (i) Copy rights are reserved.  
Nobody is allowed to print it in any form.  
Defaulters will be prosecuted.
- (ii) Subject to change in the syllabi at any time.  
Please visit the University website time to time.

**Interdisciplinary Course in Human Genetic (PG)**

**SCHEME OF COURSE**

**Interdisciplinary/Optional Courses in Human Genetics (PG) — For other departments**

Course No.	C /E /I	Course Title	Course	L	T	P	Total Credi ts	Total Marks		
								Max Mark	Mid Sem	End Sem
<b>SEMESTER-ODD</b>										
<b>HGL-053</b>	<b>1</b>	<b>Human Genetics: Concepts and Applications</b>	<b>PG</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>100</b>	<b>20</b>	<b>80</b>
<b>SEMESTER- EVEN</b>										
<b>HGL-054</b>	<b>1</b>	<b>Basic Concepts in Human Genetics</b>	<b>PG</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>100</b>	<b>20</b>	<b>80</b>

**The Interdisciplinary Courses are offered for the students of other departments of Guru Nanak Dev University Campus, Amritsar.**

**Interdisciplinary Course in Human Genetic (PG)****HGL-053 HUMAN GENETICS: CONCEPTS AND APPLICATIONS  
(Odd Semester)****Time: 3 Hours****Credits: 3-1-0****Max. Marks: 100****Mid Semester Marks : 20****End Semester Marks : 80****Mid Semester Examination: 20% weightage****End Semester Examination: 80% weightage****Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

An overview of Human Genetics, Introduction to different fields of Human Genetics, Pedigree analysis, Patterns of inheritance, Problems in modes of inheritance, assignment of genotypes, genetic heterogeneity, Origin and consequences of point and chromosomal mutations

**Section B**

Structural and molecular organization of Human nuclear and mitochondrial genome, The Human Genome Project.

**Section C**

Genetic traits, diseases and disorders. Single gene disorders — Autosomal, X-linked, Y-linked Mitochondrial, Multifactorial and polygenic (complex) disorders. Gamete maturation, ovulation and embryonic development, Sex ratios, Sexual development, Dosage compensation.

**Section D**

Prenatal and postnatal diagnosis, Chorionic villus sampling (CVS), amniotic fluid testing, Preimplantation diagnosis, Maternal serum screening, DNA fingerprinting, Genetic disorders and their management, Human genetics and ethical concerns.

**Books Recommended:**

1. Cummings, M.R. (2010). Human Heredity: Principles and Issues. Brooks/Cole PublishingCo., Pacific Grove, CA, 9<sup>th</sup> ed.
2. Gardner, A. and Davies, T. (2009). Human Genetics. Scion Publishing, 2<sup>nd</sup> ed.
3. Korf, B.R. and Irons, M.B. (2013). Human Genetics and Genomics. Wiley-Blackwell, Malaysia, 4<sup>th</sup> ed.
4. Lewis, R. (2008). Human Genetics: Concepts and Applications. McGraw-Hill Publishing, New York, 8<sup>th</sup> ed.
5. Lewis, R. (2010). Human Genetics: The Basics. Routledge, 1<sup>st</sup> ed.
6. Mange, E.J. and Mange, A.P. (1999). Basic Human Genetics. Sinauer, Sunderland.
7. Skirton, H. and Patch, C. (2009). Genetics for the Health Sciences. Scion Publishing.
8. Turnpenny, P.D. and Ellard, S. (2011). Emery's Elements of Medical Genetics. Churchill Livingstone, 14<sup>th</sup> ed.

**Interdisciplinary Course in Human Genetic (PG)****HGL-054 BASIC CONCEPTS IN HUMAN GENETICS  
(Even Semester)****Time: 3 Hours****Credits: 3-1-0****Max. Marks: 100****Mid Semester Marks : 20****End Semester Marks : 80****Mid Semester Examination: 20% weightage****End Semester Examination: 80% weightage****Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

Overview of genetics, Cell and cell components, Prokaryotic/Eukaryotic cells, Cell division — Mitosis, Meiosis, Gametogenesis. Human sex determination.

**Section B**

Molecular basis of inheritance — Chemical composition of DNA, DNA structure, DNA replication. Gene action — From DNA to protein, Gene mutations and chromosomes,

**Section C**

Basic concepts of inheritance — Mendelian inheritance, Modes of inheritance, Multifactorial traits. Genetic diseases and disorders

**Section D**

Human genome — Nuclear and mitochondrial, , Human Genome Project. Manipulation of genetic material — Genetic engineering, Genetic forensics, Genetic testing, Gene therapy, Cloning.

**Books Recommended:**

1. Adkison, L. and Brown, M.D. (2007). Elsevier's Integrated Genetics (Elsevier's IntegratedS.) Mosby (St. Louis).
2. Hartwell, L., Hood, L., Goldberg, M. and Reynolds, A. (2008). Genetics: From Genes to Genomes. McGraw-Hill Higher Education, 3<sup>rd</sup> ed.
3. Lewis, R. (2011). Human Genetics — The Basics. Routledge, London.
4. Mange, E.J. and Mange, A.P. (1999), Basic Human Genetics. Sinauer, Sunderland.
5. Passarge, E. (2007). Color Atlas of Genetics. Thieme, 3<sup>rd</sup> ed.
6. Tamarin, R.H. (2001). Principles of Genetics. WCB/McGraw-Hill, 7<sup>th</sup> ed.