

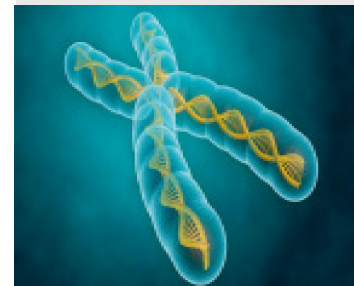
# 21GPBR111 FUNDAMENTALS OF GENETICS

Hours Per Week :

L	T	P	C
2	-	2	3

Total Hours :

L	T	P
30	-	30



Source :

<https://online.stanford.edu/courses/xgen101-fundamentals-genetics-genetics-you-need-know>

## Course Description and Objectives:

The aim of this course is to provide a good understanding of the basic concepts and principles of genetics and their application in developing improved varieties

## Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Enable to acquaint comprehensive, detailed understanding of genetics, heredity in crop plants to improve and develop the new varieties
2	Enable to design, execute, and analyze the results of genetic experimentation in plant systems
3	Can empower the beneficiaries on the role of genetic technologies in industries related to Biotechnology, and other fields

## SKILLS:

- ✓ *Handling of different equipment's used in crop improvement*
- ✓ *Isolation of Plant DNA*

**ACTIVITIES:**

- o *Practice on mitotic and meiotic cell division*
- o *Prepare models on DNA and RNA structure*
- o *Microscopic study of cell structure*
- o *Draw the pictures of different cell organelles and their functions*

**UNIT - 1**

**Introduction:** Pre-Mendelian concepts of heredity; Mendelian principles of heredity; Cell division – mitosis and meiosis; Probability and Chi-square; Dominance relationships; Gene interaction; Multiple factor hypothesis

**UNIT - 2**

Epistatic interactions with examples; Multiple alleles; Linkage and its estimation; Crossing over mechanisms; Chromosome mapping; Pleiotropism and Pseudoalleles

**UNIT - 3**

Sex determination and sex linkage; sex limited and sex influenced traits; Structural changes in chromosome; Mutation- classification, mutagenic agents and methods of inducing mutation and CIB technique.

**UNIT - 4**

Qualitative & quantitative traits; Polygenes and continuous variations; Cytoplasmic inheritance; Gene concept: Gene structure, function and regulation (eg. Lac operon)

**UNIT - 5**

Nature, structure & replication of genetic material. Protein synthesis- Transcription and translational mechanisms of genetic material

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

1. Study of microscope
2. Study of cell structure
3. Practice on mitotic cell division
4. Practice on meiotic cell division
5. Practice on meiotic cell division
6. Probability and Chi-square test
7. Monohybrid and Dihybrid and their modifications
8. Trihybrid and its modifications
9. Test cross and back cross
10. Epistatic interactions including test cross and back cross
11. Epistatic interactions including test cross and back cross
12. Epistatic interactions including test cross and back cross
13. Determination of linkage and cross over analysis (through two point test cross data)
14. Determination of linkage and cross over analysis (through three point test cross data)
15. Study of models on DNA and RNA structure

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## REFERENCES:

1. Pundhan Singh. 2006. *Genetics*. Kalyani Publishers, Ludhiana
2. Singh, B.D. 2015. *Fundamentals of Genetics*. Kalyani Publishers, Ludhiana
3. Gupta, P.K. 2007. *Genetics*. Rastogi Publications, Meerut
4. Khanna, V.K. 2002. *Genetics Numerical Problems*. Kalyani publishers. 2<sup>nd</sup> edition
5. Pundhan Singh. 2011. *Genetics at a Glance*. Kalyani Publishers, Ludhiana
6. Verma , P.S. and Agarwal, P.K. 2013. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand & Company Pvt. Ltd., Kolkata
7. Snustad, D.P. and Simmons, M.J. 2010. *Principles of Genetics*. 5<sup>th</sup> Ed. John Wiley & Sons, 111, River Street, Hoboken, NJ, U.S.A
8. Strickberger, M.W. 2006. *Genetics*. Prentice – Hall of India Pvt. Ltd., New Delhi

