

Syllabus for B.Sc. (Hons) Agriculture Year – II (Sem. III)

Subject Code: 16AS0312

Subject Short Name: GPB. 3.1

Subject Name: Principles of Genetics

Objective:

1. To make the students acquainted with both principles and practices in the areas of classical genetics, modern genetics, quantitative genetics and cytogenetics.

Credits Earned: 3 Credits (2+1)

Course Outcomes: After completion of this course, Students will be able to

- Know the gene structures and its functions in the plant
- Discuss the linkage, crossing over, sex determination and sex linkage, sex limited and sex influenced traits, cytoplasmic inheritance, polygenic inheritance and mutation.
- Have the knowledge of genetics, cell and its organelles and cell division.
- Have the basics of chromosome structure, multiple alleles, pleiotropism and pseudoalleles and blood group genetics.
- Explain chromosomal aberrations, DNA /RNA structure and replication of genetic material.
- Have the clear concept of transcription and translation and operon models

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Progressive Assessment (PA)	Viva (V)	Term work (TW)	
2	0	2	3	40	20	20	10	10	100

Theory Content:

Unit	Topics	Contact Hours
1	Introduction to Genetics, Cell and cell division	2
2	Pre and Post Mendelian concepts of heredity and Mendelian principles of heredity	2

3	Study of model organisms (Drosophila, Arabidopsis, Garden pea, E. coli, and mice), Chromosome Structure, Multiple alleles, pleiotropism and pseudoalleles	4
4	Chromosomal and cytoplasmic of inheritance, Probability and Chi-square	3
5	Epistatic interaction, Sex determination, Sex linkage, Sex limited and Sex influenced traits, Blood group genetics	2
6	Introduction and definition of cytology, genetics and cytogenetics and their interrelation	1
7	Linkage and its estimation, crossing over mechanism and chromosome mapping	1
8	Study of chromosomal aberration and genetic material	1
9	Use of haploids, dihaploids and double haploids in Genetics	1
10	Mutation and Gene concept	3
11	Qualitative and quantitative trait and variation, multiple factor hypothesis	2
12	Protein synthesis, Transcription and translational mechanism of genetic material	2
	Total	24

Practical Content:

Unit	Topics	Contact Hours
1	Study of microscope	2
2	Study of cell and cell organelles: Structure and Function	2
3	Practices on mitotic and meiotic cell division	2
4	Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross	2
5	Experiments on epistatic interactions including test cross and back cross	2
6	Experiments on probability and chi-square test	2
7	Determination of linkage and cross-over analysis (through two point test cross and three point test cross data)	4
8	Study on sex linked inheritance in Drosophila	2

9	Study on models on DNA and RNA structures	2
	Total	20

Reference Books:

- Singh, B. D. (2018). Fundamentals of Genetics, Kalyani Publication Ltd., New Delhi, India.
- Strickberger, M. W. (1976). Genetics, Macmillan Publication, London, United Kingdom.
- Gardner, Simmons, M. J., Snustad, D. P. (2006). Principles of Genetics, John Wiley & Sons Publication, Hoboken, New Jersey.
- Sinnott, Edmund W., Dunn, L.C., Dobzhansky, Th. (1950). Principles of Genetics, McGraw-Hill, New York, United States.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
25%	25%	20%	10%	10%	10%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the class-rooms.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory/ field.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.