

INSTITUTE	FACULTY OF AGRICULTURE
PROGRAM	BACHELOR OF SCIENCE (Hons.) AGRICULTURE
SEMESTER	2
COURSE TITLE	FUNDAMENTALS OF GENETICS
COURSE CODE	16AS0207
COURSE CREDITS	3

Objective:

- 1 To provide the basic knowledge of genetics, Mendelian inheritance and its exceptions.
- 2 To understand how nucleic acid transport genetic information.
- 3 To distinguish mechanisms of genetic exchange.
- 4 To understand mutations and chromosomal structures and aberrations.

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

- 1 Students will be able to know the gene structures and its functions in the plant
- 2 Students will be able to discuss the linkage, crossing over, sex determination and sex linkage, sex limited and sex influenced traits, cytoplasmic inheritance, polygenic inheritance and mutation
- 3 Students will have the knowledge of genetics, cell and its organelles and cell division.
- 4 Students have the basics of chromosome structure, multiple alleles, pleiotropism and pseudoalleles and blood group genetics.
- 5 Students will be able to explain chromosomal aberrations, DNA /RNA structure and replication of genetic material
- 6 Students will have the clear concept of transcription and translation and operon models

Pre-requisite of course: To create the awareness among the students about cell division, cell enlargement, mitosis and meiosis processes taken place in the plants.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction to genetics Introduction to genetics	2
2	Cell division: mitosis and meiosis Cell division: mitosis and meiosis	2
3	Mendelian principles of heredity Mendelian principles of heredity	2

Contents : Unit	Topics	Contact Hours
4	Study of chromosome structure, multiple alleles, pleiotropism and pseudoalleles and blood group genetics Study of chromosome structure, multiple alleles, pleiotropism and pseudoalleles and blood group genetics	2
5	Linkage and its estimation, crossing over mechanisms, chromosome mapping Linkage and its estimation, crossing over mechanisms, chromosome mapping	2
6	Sex determination and sex linkage, sex limited and sex influenced traits Sex determination and sex linkage, sex limited and sex influenced traits	2
7	Qualitative and quantitative traits, polygenes and continuous variations, multiple factor hypothesis Qualitative and quantitative traits, polygenes and continuous variations, multiple factor hypothesis	2
8	Cytoplasmic inheritance Cytoplasmic inheritance	2
9	Mutation- classification, methods inducing mutation and CIB technique, mutagenic agents and induction of mutation Mutation- classification, methods inducing mutation and CIB technique, mutagenic agents and induction of mutation	2
10	Structural and numerical changes in chromosome; nature, structure and replication of genetic material Structural and numerical changes in chromosome; nature, structure and replication of genetic material	2
11	Protein synthesis- transcription and translational mechanism of genetic material Protein synthesis- transcription and translational mechanism of genetic material	2
12	Gene concept- gene structure and functions Gene concept- gene structure and functions	2
13	Gene regulation- Lac and Trp operons Gene regulation- Lac and Trp operons	2
Total Hours		26

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Study of microscope Study of microscope	2
2	Study of cell structure and functions Study of cell structure and functions	2
3	Practice on mitotic and meiotic cell division Practice on mitotic and meiotic cell division	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
4	Experiments on monohybrid, dihybrid, trihybrid, back cross and test cross Experiments on monohybrid, dihybrid, trihybrid, back cross and test cross	2
5	Chi-square test, epistatic interactions Chi-square test, epistatic interactions	2
6	Determination of linkage and cross over analysis (through two point test cross and three point test cross data) Determination of linkage and cross over analysis (through two point test cross and three point test cross data)	2
Total Hours		12

Textbook :

- 1 NA, NA, NA, NA

References:

- 1 Genetics, Genetics, Gupta, P. K., Rashtogi Publication, 2009
- 2 Fundamentals of Genetics, Fundamentals of Genetics, Singh, B. D., Kalyani Publication Ltd., 2018
- 3 Genetics- A conceptual approach, Genetics- A conceptual approach, Benjamin Pierce, MacMillan Learning publication, 2012

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as 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 / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
25.00	25.00	20.00	10.00	10.00	10.00

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 black board may also use any of tools such as demonstration, role play, quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.