DEPARTMENT OF BOTANY				*CLASS: I M.Sc. Botany*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
II	Practical	21P2BMP3	Practical III	2	4	40	60	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	✓
Skill oriented	✓		Entrepreneurship oriented	

Course Objectives:

1. To observe chromosomes and different stages of cell divisions.
2. To demonstrate the methods of isolation and quantification of DNA.
3. To solve problems related to Genetics and construct genetic mapping.
4. To apply plant breeding techniques for crop improvement.

Practicals - Cell and Molecular Biology

1. Squash preparation of onion root tips to study mitosis
2. Smear preparation of maize or onion flower buds to study meiosis
3. Illustration of various cell organelles
4. Karyotyping and Idiogram
5. Isolation of plant genomic DNA and its quantification by UV-spectrophotometer
6. Isolation of plasmid DNA
7. Restriction digestion of DNA and its analysis by agarose gel electrophoresis
8. Isolation of RNA and its quantification by UV-spectrophotometric method
9. SDS-PAGE analysis of seed storage proteins (globulins) from legumes
10. Blotting techniques
11. RFLP genetic mapping
12. PCR techniques
13. Recombination mapping in bacteria
14. Calculation of recombination frequency

Practicals - Genetics, Plant Breeding and Evolution

1. Problem solving on dihybrid phenotypic, genotypic and test cross ratios
2. Incomplete dominance in plants
3. Interaction of factors and modified dihybrid ratios
4. Multiple alleles in plants, blood group inheritance in humans
5. Sex linked inheritance in *Drosophila* and plants
6. Quantitative inheritance in plants
7. Tetrad analysis in *Neurospora*
8. Complementation analysis to find out complementation groups in viruses
9. Chromosome mapping from three point test cross data
10. Calculation of chiasmatic interference
11. Calculate gene and genotypic frequency by Hardy-Weinberg equation
12. Techniques in plant hybridization

Rationale for Nature of the Course:

The course focuses on the practical skills in laboratory on observation of chromosomes, different stages of cell division in plants, genomic DNA isolation, problems related to Genetics and various plant breeding techniques.

Activities having direct bearing on Skill development / Employability / Entrepreneurship:

The knowledge and skills acquired by the students will enable them to understand the types of cell division in plants, isolation of genetic material and solve the problems related to Mendelian concepts in Genetics. The various plant breeding methods for crop improvement will help them to equip themselves on self-employability.

Pedagogy:

Live Demonstration, Group Experiment, Chalk and Talk, Power Point, Problem Solving, Virtual Labs & You Tube Videos.

Course Designers:

Prof. V. Meenakshi Sundaram, Assistant Professor
Dr. N. Janakiraman, Assistant Professor

Lecture Schedule

Practical	Description	Hours	Mode
1	Squash preparation of onion root tips to study mitosis	2	Group Experiment
2	Smear preparation of maize or onion flower buds to study meiosis	2	Group Experiment
3	Illustration of various cell organelles	2	Photograph
4	Karyotyping and Idiogram	2	Virtual Lab
5	Isolation of plant genomic DNA and its quantification by UV-spectrophotometer	2	Group Experiment
6	Isolation of plasmid DNA	2	Group Experiment
7	Restriction digestion of DNA and its analysis by agarose gel electrophoresis	2	Group Experiment
8	Isolation of RNA and its quantification by UV-spectrophotometric method	2	Group Experiment
9	SDS-PAGE analysis of seed storage proteins (globulins) from legumes	2	Group Experiment
10	Blotting techniques	2	Demonstration
11	RFLP genetic mapping	2	Virtual Lab
12	PCR techniques	4	Group Experiment
13	Recombination mapping in bacteria	2	Virtual Lab
14	Calculation of recombination frequency	2	Problems
15	Problem solving on dihybrid phenotypic, genotypic and test cross ratios	4	Problems
16	Incomplete dominance in plants	2	Problems
17	Interaction of factors and modified dihybrid ratios	2	Problems
18	Multiple alleles in plants, blood group inheritance in humans	2	Problems

19	Sex linked inheritance in *Drosophila* and plants	2	Problems
20	Quantitative inheritance in plants	2	Problems
21	Tetrad analysis in *Neurospora*	2	Virtual Lab
22	Complementation analysis to find out complementation groups in viruses	2	Virtual Lab
23	Chromosome mapping from three point test cross data	2	Problems
24	Calculation of chiasmatic interference	2	Problems
25	Calculate gene and genotypic frequency by Hardy-Weinberg equation	2	Problems
26	Techniques in plant hybridization	6	Group Experiment

Course Learning Outcomes:

On successful completion of the course, the students will be able to know, understand, apply, analyse and evaluate

CLOs	CLO Statement	Knowledge Level
CLO 1	The techniques in observation of cell organelles, cell divisions, karyogram and idiogram	Up to K4
CLO 2	The DNA isolation and physical mapping techniques	Up to K4
CLO 3	The phenotypic and genotypic ratios from the given crosses of different allelic or gene interactions	Up to K4
CLO 4	The construction of genetic methods of chromosome mapping	Up to K4
CLO 5	The demonstration of various plant breeding techniques for crop improvement	Up to K4

Mapping Programme Specific Outcomes with Course Learning Outcomes:

#	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	3	3	3	3	2
CLO 2	2	2	2	2	2
CLO 3	2	3	2	3	3
CLO 4	3	2	3	2	2
CLO 5	2	2	2	3	3