

**I – Academic Planner****A. Teaching Plan (Year :2021-2022 ,Semester: **Odd** ( III, V))****Teacher's Name: Dr. Sunil Kumar Dhiman Department: Botany**

S. No.	UPC	Paper Name	Core/AECC/GE /SEC	Topic/Unit	Start Date	EndDate
1	32161303	Genetics (THEORY)	Core Course VII	Unit 3: Linkage, crossing over and chromosome mapping, Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage. Unit 5: Gene mutations, Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIBmethod.Role of Transposons in mutation.DNA repair mechanisms. Unit 6: Fine structure of gene, Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus. Unit 7: Population and Evolutionary Genetics, Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection mutation, genetic drift.Genetic variation and Speciation.	20 July 2021	15 December 2021
2	32161303	Genetics (PRACTICAL)	Core Course VII	1. Meiosis through temporary squash preparation. 2. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square analysis. 3. Chromosome mapping using test cross data. 4. Pedigree analysis for dominant and recessive	20 July 2021	15 December 2021

				<p>autosomal and sex linked traits.</p> <p>5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)</p> <p>6. Blood Typing: ABO groups &amp; Rh factor.</p> <p>7. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.</p> <p>8. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.</p> <p>9. Study of human genetic traits: Sickle cell anemia, XerodermaPigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe.</p>		
3	32167501	Analytical Techniques in Plant Sciences (THEORY)	Core	<p>Unit 1: Imaging and related techniques, Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS); (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.</p> <p>Unit 2: Cell fractionation, Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl<sub>2</sub> gradient, analytical centrifugation, ultracentrifugation, marker enzymes.</p> <p>Unit 3: Radioisotopes, Use in biological research, auto-radiography, pulse chase experiment.</p>	20 July 2021	15 December 2021
4	32167501	Analytical Techniques in	DSE	<p>1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting,</p>	20 July 2021	15 December

		Plant Sciences (PRACTICAL)		DNA sequencing, PCR through photographs. 2. Demonstration of ELISA. 3. To separate nitrogenous bases by paper chromatography. 4. To separate sugars by thin layer chromatography. 5. Isolation of chloroplasts by differential centrifugation. 6. To separate chloroplast pigments by column chromatography. 7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE. 9. To separation DNA (marker) using AGE. 10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH). 11. Preparation of permanent slides (double staining).		2021
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## A. Teaching Plan (Year : 2021-2022, Semester: Even ( IV, VI))

Teacher's Name: Dr. Sunil Kumar Dhiman Department: Botany

S. No.	UPC	Paper Name	Core/AECC/G E/SEC	Topic/Unit	Start Date	End Date
1	32161202	Archegoniatae (THEORY)	Core	Unit 1: Introduction, Unifying features of archegoniates; Transition to land habit; Alternation of generations. Unit 2: Bryophytes, General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). Riccia, Marchantia, Porella, Anthoceros, Sphagnum and Funaria; Reproduction and evolutionary trends in Riccia, Marchantia, Anthoceros and Funaria (developmental stages not included). Ecological and economic importance of bryophytes with special reference to Sphagnum. Unit 3: Pteridophytes, General characteristics, classification, Apogamy, and apospory, and seed habit, stellar evolution. Ecological and economic importance.	7 April 2022	26 July 2022
1	32161202	Archegoniatae (PRACTICAL)	Core	1. Riccia – Morphology of thallus. 2. Marchantia- Morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides). 3. Anthoceros- Morphology of thallus, dissection of	7 April 2022	26 July 2022

				<p>sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide).</p> <p>4. Peltia, Porella- Permanent slides.</p> <p>5. Sphagnum- Morphology of plant, whole mount of leaf (permanent slide only).</p> <p>6. Funaria- Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema.</p> <p>7. Psilotum- Study of specimen, transverse section of synangium (permanent slide).</p> <p>8. Selaginella- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).</p>		
3	32161401	Molecular Biology (THEORY)	Core	<p>Unit 1: Nucleic acids : Carriers of genetic information, Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey &amp; Chase, Avery, McLeod &amp; McCarty, Fraenkel-Conrat's experiment.</p> <p>Unit 3: The replication of DNA, Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, <math>\theta</math> (theta) mode of replication, replication of linear ds-DNA, replication of the 5' end of linear chromosome; Enzymes involved in DNA replication. Unit 3: Central dogma and genetic code (2 lectures) Key experiments establishing- The Central Dogma</p>	3 January 2022	20 May 2022

				(Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features) Unit 4: Mechanism of Transcription, Transcription in prokaryotes; Transcription in eukaryotes Unit 5: Processing and modification of RNA, Split genes-concept of introns and exons, removal of introns, spliceosome machinery.		
4	32161401	Molecular Biology (PRACTICAL)	Core	Unit 1. Preparation of LB medium and raising <i>E.Coli</i> . Unit 2. Isolation of genomic DNA from <i>E.Coli</i> . Unit 3. DNA isolation from cauliflower head. Unit 4. DNA estimation by diphenylamine reagent/UV Spectrophotometry. Unit 5. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication). Unit 6. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs. Unit 7. Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments) Unit 8. Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing. Pteridophytes	3 Jan 2022	20 May 2022
2	32161602	Plant Biotechnology (THEORY)	Core	Unit 2: Recombinant DNA technology, Restriction Endonucleases (History, Types I-IV, biological role and application); Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage,	3 January 2022	20 May 2022

				M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC). Gene Cloning (Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCR-mediated gene cloning); Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; Probes-oligonucleotide, heterologous, PCR; Methods of gene transfer- Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).		
2	32161602	Plant Biotechnology (PRACTICAL)	Core	<ol style="list-style-type: none"> <li>1. (a) Preparation of MS medium.</li> <li>(b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc.</li> <li>2. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis &amp; artificial seeds through photographs.</li> <li>3. Isolation of protoplasts.</li> <li>4. Construction of restriction map of circular and linear DNA from the data provided.</li> <li>5. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.</li> <li>6. Study of steps of genetic engineering for production of Bt cotton, Golden rice, FlavrSavr tomato through photographs.</li> <li>7. Isolation of plasmid DNA. 8. Restriction digestion and gel electrophoresis of plasmid DNA.</li> </ol>	3 January 2022	20 May 2022

**B. Internal Assessment: House Exam (Test/Presentationetc.)&Assignment\***

Course Code	Course Name	Unique Paper Code	Topic Name	Day and Date	Date/s of Exhibiting the Assessment Sheet to students, Discussing the marks, Returning/Retaining
556	B.Sc Botany (Hon) II Sem	32161202	Archegoniatae	Assignment- 18-6-2022 Test- 23-6-2022	Assi.& test 30-06-2022
556	B.Sc Botany (Hon) III Sem	32161303	Genetics		
556	B.Sc Botany (Hon) IV Sem	32161401	Molecular Biology		
556	B.Sc Botany (Hon) V Sem	32167501	Analytical Techniques in Plant Sciences		
556	B.Sc Botany (Hon) VI Sem	32161602	Plant Biotechnology		

\*Marks of the Internal Assessment to be submitted to the College 15 days before the last working day of every semester