

2016-17

ACADEMIC PLANNER

B.Sc(H) Botany (Paper 20-GGHT-501-Genetics and Genomics)

July 16-	Unit 1- Introduction to Genetics
August 16-	Unit-3- Mendelian Genetics and its Extension
September 16-	Unit-6- Sex Determination Unit-7- Extrachromosomal Inheritance
October 16-	Unit-7- Extrachromosomal Inheritance Unit-4- Linkage, Crossing Over and Chromosomal mapping
November 16-	Unit-4- Linkage, Crossing Over and Chromosomal mapping

B.Sc. (Life Sciences) III yr. LSPT- 501-Genetics and Genomics

July 16-	Unit 1- Heredity
August 16-	Unit-1- Heredity
September 16-	Unit-2- Sex Determination and Sex-linked Inheritance Unit-3- - Linkage and Crossing Over
October 16-	Unit-3- - Linkage and Crossing Over
November 16-	Revision

I – Academic Planner

A. Teaching Plan (Year :2017-2018 ,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: ClBmethod.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 2017	16 December 2017
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 autosomal and sex linked traits. 5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4) 6. Blood Typing: ABO groups & Rh factor.	20 July 2017	16 December 2017

				<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, Xeroderma Pigmentosum, 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, CsCl₂ gradient, analytical centrifugation, ultracentrifugation, marker enzymes.</p> <p>Unit 3: Radioisotopes, Use in biological research, auto-radiography, pulse chase experiment.</p>	20 July 2017	16 December 2017
4	32167501	Analytical Techniques in Plant Sciences (PRACTICAL)	DSE	<p>1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs.</p> <p>2. Demonstration of ELISA.</p> <p>3. To separate nitrogenous bases by paper chromatography.</p> <p>4. To separate sugars by thin layer chromatography.</p> <p>5. Isolation of chloroplasts by differential centrifugation.</p> <p>6. To separate chloroplast pigments by column chromatography.</p>	20 July 2017	16 December 2017

				<p>7. To estimate protein concentration through Lowry's methods.</p> <p>8. To separate proteins using PAGE.</p> <p>9. To separation DNA (marker) using AGE.</p> <p>10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).</p> <p>11. Preparation of permanent slides (double staining).</p>		
5	32161301	Anatomy of Angiosperms Practical	Core	Complete Syllabus	20 July 2017	16 December 2017

A. Teaching Plan (Year : 2017-2018, Semester: Even (IV, VI))

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

S. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32161202	Archegoniatae(THEORY)	Core	<p>Unit 1: Introduction, Unifying features of archegoniates; Transition to land habit; Alternation of generations.</p> <p>Unit 2: Bryophytes, General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). Riccia, Marchantia, Peltia, 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.</p> <p>Unit 3: Pteridophytes, General characteristics,</p>	1 January 2018	19 May 2018

				classification, Apogamy, and apospory, heterospory and seed habit, stellar evolution. Ecological and economic importance.		
1	32161202	Archegoniatae (PRACTICAL)	Core	<p>1. Riccia – Morphology of thallus.</p> <p>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).</p> <p>3. Anthoceros- Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide).</p> <p>4. Pellia, 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>	1 January 2018	19 May 2018
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 & Chase, Avery, McLeod & 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</p>	1 January 2018	19 May 2018

				<p>discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (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 (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)</p> <p>Unit 4: Mechanism of Transcription, Transcription in prokaryotes; Transcription in eukaryotes</p> <p>Unit 5: Processing and modification of RNA, Split genes-concept of introns and exons, removal of introns, spliceosome machinery.</p>		
4	32161401	Molecular Biology (PRACTICAL)	Core	<p>Unit 1. Preparation of LB medium and raising <i>E. Coli</i>.</p> <p>Unit 2. Isolation of genomic DNA from <i>E. Coli</i>.</p> <p>Unit 3. DNA isolation from cauliflower head.</p> <p>Unit 4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.</p> <p>Unit 5. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).</p> <p>Unit 6. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs.</p> <p>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)</p> <p>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</p>	1 January 2018	19 May 2018
2	32161602	Plant Biotechnology (THEORY)	Core	<p>Unit 2: Recombinant DNA technology, Restriction Endonucleases (History, Types I-IV, biological role and application); Restriction Mapping (Linear and</p>	1 January 2018	19 May 2018

				<p>Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, 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).</p>		
2	32161602	Plant Biotechnology (PRACTICAL)	Core	<ol style="list-style-type: none"> 1. (a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc. 2. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs. 3. Isolation of protoplasts. 4. Construction of restriction map of circular and linear DNA from the data provided. 5. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment. 6. Study of steps of genetic engineering for production of Bt cotton, Golden rice, FlavrSavr tomato through photographs. 7. Isolation of plasmid DNA. 8. Restriction digestion and gel electrophoresis of plasmid DNA. 		

B. FDP/Seminar/Workshops/Lectures to be attended and/or to be conducted by Teachers

1.

Event Topic		How to become a beaurocrat.			
Type / Nature (FDP/Webinar/Workshop etc.)		Seminar			
Organizing In-charge		Dr. Sunil Kumar Dhiman			
Details regarding invited Resource Person		Manoj Pingua (IAS)			
Nature of Participation (e.g. Invited Speaker, Participant etc.)		Organizer			
Date/s	August 2017	Timing/s	11.0 am to 12.0 am	Mode	Offline

2.

Event Topic		Plant biotechnology			
Type / Nature (FDP/Webinar/Workshop etc.)		Seminar			
Organizing In-charge		Dr. Sunil Kumar Dhiman			
Details regarding invited Resource Person		Prof. Veena Agrawal			
Nature of Participation (e.g. Invited Speaker, Participant etc.)		Organizer			
Date/s	15february 2018	Timing/s	11.0 am to 12.0 am	Mode	Offline

3.

Event Topic	Saviour of Earth
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Type / Nature (FDP/Webinar/Workshop etc.)		Seminar			
Organizing In-charge		Dr. Sunil Kumar Dhiman			
Details regarding invited Resource Person		Ravi kalra			
Nature of Participation (e.g. Invited Speaker, Participant etc.)		Organizer			
Date/s	19 Sep to 20 Sep 2019	Timing/s	11.0 am to 12.0 pm	Mode	Offline

4.

Event Topic		Functional genomics			
Type / Nature (FDP/Webinar/Workshop etc.)		Seminar			
Organizing In-charge		Dr. Sunil kumardhiman			
Details regarding invited Resource Person		Dr. J.P.Muyal			
Nature of Participation (e.g. Invited Speaker, Participant etc.)		Organizer			
Date/s	29 August 2018	Timing/s	11.0 am to 12.0 am	Mode	Offline

. 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	Test 24-2-2018 Ass. 27-2-2018	Test 17-3-2018 Ass 12-3-2018
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**

Dr. Sunil Kumar Dhiman
Department of Botany

I – Academic Planner

B. Teaching Plan (Year :2018-2019, 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	<p>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.</p> <p>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: ClBmethod.Role of Transposons in mutation.DNA repair mechanisms.</p> <p>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.</p> <p>Unit 7: Population and Evolutionary Genetics, Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection mutation, genetic drift.Genetic variation and Speciation.</p>	20 July 2018	16 December 2018
2	32161303	Genetics (PRACTICAL)	Core Course VII	<ol style="list-style-type: none">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 autosomal and sex linked traits.5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)6. Blood Typing: ABO groups & Rh factor.	20 July 2018	16 December 2018

				<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, Xeroderma Pigmentosum, 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, CsCl₂ gradient, analytical centrifugation, ultracentrifugation, marker enzymes.</p> <p>Unit 3: Radioisotopes, Use in biological research, auto-radiography, pulse chase experiment.</p>	20 July 2018	16 December 2018
4	32167501	Analytical Techniques in Plant Sciences (PRACTICAL)	DSE	<p>1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs.</p> <p>2. Demonstration of ELISA.</p> <p>3. To separate nitrogenous bases by paper chromatography.</p> <p>4. To separate sugars by thin layer chromatography.</p> <p>5. Isolation of chloroplasts by differential centrifugation.</p> <p>6. To separate chloroplast pigments by column chromatography.</p>	20 July 2018	16 December 2018

				<p>7. To estimate protein concentration through Lowry's methods.</p> <p>8. To separate proteins using PAGE.</p> <p>9. To separation DNA (marker) using AGE.</p> <p>10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).</p> <p>11. Preparation of permanent slides (double staining).</p>		
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B. Teaching Plan (Year : 2018-2019, Semester: Even (IV, VI))

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

S. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32161202	Archegoniatae(THEORY)	Core	<p>Unit 1: Introduction, Unifying features of archegoniates; Transition to land habit; Alternation of generations.</p> <p>Unit 2: Bryophytes, General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). Riccia, Marchantia, Pellia, 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.</p> <p>Unit 3: Pteridophytes, General characteristics, classification, Apogamy, and apospory, heterospory and seed habit, stellar evolution. Ecological and economic importance.</p>	1 January 2019	25 May 2019
1	32161202	Archegoniatae (PRACTICAL)	Core	<p>1. Riccia – Morphology of thallus.</p> <p>2. Marchantia- Morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus</p>	1 January 2019	25 May 2019

				<p>through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides).</p> <p>3. Anthoceros- Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide).</p> <p>4. Pellia, 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 & Chase, Avery, McLeod & 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, θ (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>	1 January 2019	25 May 2019

				(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	1 January 2019	25 May 2019
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, 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;	1 January 2019	25 May 2019

				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"> 1. (a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc. 2. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs. 3. Isolation of protoplasts. 4. Construction of restriction map of circular and linear DNA from the data provided. 5. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment. 6. Study of steps of genetic engineering for production of Bt cotton, Golden rice, FlavrSavr tomato through photographs. 7. Isolation of plasmid DNA. 8. Restriction digestion and gel electrophoresis of plasmid DNA. 		

C. FDP/Seminar/Workshops/Lectures to be attended and/or to be conducted by Teachers

1.

Event Topic	Microbes and Nanotechnology for Sustainable Environment
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Type / Nature (FDP/Webinar/Workshop etc.)	National Symposium				
Organizing In-charge	Dr. Rajni Gupta				
Details regarding invited Resource Person	External				
Nature of Participation (e.g. Invited Speaker, Participant etc.)	Participated and acted as organizing member				
Date/s	7 February 2019	Timing/s	9.0 am to 4.0 pm	Mode	Offline

2.

Event Topic	One day workshop on "Basic Laboratory Techniques " for Non Teaching Staff				
Type / Nature (FDP/Webinar/Workshop etc.)	Workshop				
Organizing In-charge	Dr. RenuKathpalia				
Details regarding invited Resource Person	College Teachers				
Nature of Participation (e.g. Invited Speaker, Participant etc.)	Organizing member				
Date/s	12 July 2019	Timing/s	9.0 am to 4.0 pm	Mode	Offline

3.

Event Topic	Basic Biochemical and Microbial techniques				
Type / Nature (FDP/Webinar/Workshop etc.)	Workshop				
Organizing In-charge	Dr. Renukathpaliya				
Details regarding invited Resource Person	Department teachers				
Nature of Participation (e.g. Invited Speaker, Participant etc.)	Organizing member				
Date/s	24 june to 05 july 2019	Timing/s	10.0 am to 3.0 pm	Mode	Offline

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
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556	B.Sc Botany (Hon) III Sem	32161303	Genetics		
556	B.Sc Botany (Hon) IV Sem	32161401	Molecular Biology	Test Ass	Test Ass
556	B.Sc Botany (Hon) V Sem	32167501	Analytical Techniques in Plant Sciences		

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

Dr. Sunil Kumar Dhiman
Department of Botany

I – Academic Planner

C. Teaching Plan (Year :2019-2020 ,Semester: Odd (III, V))

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

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				<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>		
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4	32167501	Analytical Techniques in Plant Sciences (PRACTICAL)	DSE	<p>1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs.</p> <p>2. Demonstration of ELISA.</p> <p>3. To separate nitrogenous bases by paper chromatography.</p> <p>4. To separate sugars by thin layer chromatography.</p> <p>5. Isolation of chloroplasts by differential centrifugation.</p> <p>6. To separate chloroplast pigments by column chromatography.</p>	20 July 2019	16 December 2019

				<p>7. To estimate protein concentration through Lowry's methods.</p> <p>8. To separate proteins using PAGE.</p> <p>9. To separation DNA (marker) using AGE.</p> <p>10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).</p> <p>11. Preparation of permanent slides (double staining).</p>		
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C. Teaching Plan (Year : 2019-2020, Semester: Even (IV, VI))

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

S. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32161202	Archegoniatae(THEORY)	Core	<p>Unit 1: Introduction, Unifying features of archegoniates; Transition to land habit; Alternation of generations.</p> <p>Unit 2: Bryophytes, General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). Riccia, Marchantia, Pellia, 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.</p> <p>Unit 3: Pteridophytes, General characteristics, classification, Apogamy, and apospory, and seed habit, stelar evolution. Ecological and economic importance.</p>	1 January 2020	25 May 2020
1	32161202	Archegoniatae (PRACTICAL)	Core	<p>1. Riccia – Morphology of thallus.</p> <p>2. Marchantia- Morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus</p>	1 January 2020	25 May 2020

				<p>through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides).</p> <p>3. Anthoceros- Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide).</p> <p>4. Pellia, 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 & Chase, Avery, McLeod & 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, θ (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>	1 January 2020	25 May 2020

				(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	1 January 2020	25 May 2020
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, 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;	1 January 2020	25 May 2020

				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"> 1. (a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc. 2. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs. 3. Isolation of protoplasts. 4. Construction of restriction map of circular and linear DNA from the data provided. 5. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment. 6. Study of steps of genetic engineering for production of Bt cotton, Golden rice, FlavrSavr tomato through photographs. 7. Isolation of plasmid DNA. 8. Restriction digestion and gel electrophoresis of plasmid DNA. 		

D. FDP/Seminar/Workshops/Lectures to be attended and/or to be conducted by Teachers

1.

Event Topic	Role of Plant Research in gravity free environment”
Type / Nature (FDP/Webinar/Workshop etc.)	Seminar

Organizing In-charge		Dr. Ram babu			
Details regarding invited Resource Person		Prof. B.C. Tripathi, Jawaharlal Nehru University and Ex Vice-Chancellor, Ravenshaw University, Odisha			
Nature of Participation (e.g. Invited Speaker, Participant etc.)		Participated and acted as organizing member			
Date/s	6th September 2019	Timing/s	10.0 am to 11.0 pm	Mode	Offline

Event Topic		Two day workshop on " DNA Barcoding and Metagenomics			
Type / Nature (FDP/Webinar/Workshop etc.)		Workshop			
Organizing In-charge		Dr. RenuKathpalia			
Details regarding invited Resource Person		Prof. S.B. Babbar, University of Delhi, Prof.Sudeshna Mazumdar Leighton, University of Delhi, Dr. Geetanjali Yadav,Scientist from NIPGR and lecturer at Cambridge University			
Nature of Participation (e.g. Invited Speaker, Participant etc.)		Participated and acted as organizing member			
Date/s	19 th to 20 th September 2019	Timing/s	9.0 am to 4.0 pm	Mode	Offline

E. 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- 22-5-2020 Test- 11-4-2020	Assi.& test 5-06-2020
556	B.Sc Botany (Hon) III	32161303	Genetics		

	Sem				
556	B.Sc Botany (Hon) IV Sem	32161401	Molecular Biology	Test-30-3-2020 Ass. 10-2-2010	Test 6-4-2010 Ass. 2-3-2010
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**

Dr. Sunil Kumar Dhiman
Department of Botany

I – Academic Planner

D. Teaching Plan (Year :2020-2021 ,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	<p>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.</p> <p>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.</p> <p>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.</p> <p>Unit 7: Population and Evolutionary Genetics, Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection mutation, genetic drift.Genetic variation and Speciation.</p>	10 August 2020	11 December 2020
2	32161303	Genetics (PRACTICAL)	Core Course VII	<ol style="list-style-type: none"> 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 autosomal and sex linked traits. 5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 	10 August 2020	11 December 2020

				<p>9:3:4) 6. Blood Typing: ABO groups & Rh factor. 7. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes. 8. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge. 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. Unit 2: Cell fractionation, Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl₂ gradient, analytical centrifugation, ultracentrifugation, marker enzymes. Unit 3: Radioisotopes, Use in biological research, auto-radiography, pulse chase experiment.</p>	10 August 2020	11 December 2020
4	32167501	Analytical Techniques in Plant Sciences (PRACTICAL)	DSE	<p>1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, 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.</p>	10 August 2020	11 December 2020

				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).		
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D. Teaching Plan (Year : 2020-2021, 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, stelar evolution. Ecological and economic importance.	1 April 2021	30 July 2021

1	32161202	Archegoniatae (PRACTICAL)	Core	<p>1. Riccia – Morphology of thallus.</p> <p>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).</p> <p>3. Anthoceros- Morphology of thallus, dissection of 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>	1 April 2021	30 July 2021
3	32161401	Molecular Biology(THEO RY)	Core	<p>Unit 1: Nucleic acids : Carriers of genetic information, Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey & Chase, Avery, McLeod & 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, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5' end of linear chromosome;</p>	2 Jan 2021	29 April 2021

				<p>Enzymes involved in DNA replication. Unit 3: Central dogma and genetic code (2 lectures) Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)</p> <p>Unit 4: Mechanism of Transcription, Transcription in prokaryotes; Transcription in eukaryotes</p> <p>Unit 5: Processing and modification of RNA, Split genes-concept of introns and exons, removal of introns, spliceosome machinery.</p>		
4	32161401	Molecular Biology (PRACTICAL)	Core	<p>Unit 1. Preparation of LB medium and raising <i>E.Coli</i>.</p> <p>Unit 2. Isolation of genomic DNA from <i>E.Coli</i>.</p> <p>Unit 3. DNA isolation from cauliflower head.</p> <p>Unit 4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.</p> <p>Unit 5. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).</p> <p>Unit 6. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs.</p> <p>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)</p> <p>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</p>	2 Jan 2021	29 April 2021
2	32161602	Plant Biotechnology (THEORY)	Core	<p>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, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC).Gene</p>	2 January 2021	25 April 2021

				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).		
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556	B.Sc Botany (Hon) III Sem	32161303	Genetics		
556	B.Sc Botany (Hon) IV Sem	32161401	Molecular Biology	Test-30-3-2021 Ass. 10-2-2021	Test 6-4-2021 Ass. 2-3-2021
556	B.Sc Botany (Hon) V Sem	32167501	Analytical Techniques in Plant Sciences		
556	B.Sc Botany (Hon) VI Sem	32161602	Plant Biotechnology		

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Dr. Sunil Dhiman

Department of Botany