

5th SEMESTER HONOURS (CORE COURSE & DSE)

SESSION: July 2022 to December 2022

**COURSE CODE: BOTACOR11T, BOTACOR12T, BOTADSE01T,
BOTADSE03T**

SEM V: CORE COURSE XI

REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

CODE: BOTACOR11T (4 Credits)

COURSE OUTCOME: **Angiosperms reproduce** sexually by means of flowers. After fertilization, ovaries within flowers develop into fruits that surround, protect, and help disperse the seeds. **Angiosperms** are also known as flower plants because that is their reproductive organ, which mature to seed-containing fruit. The fruit covering on the seed gives **angiosperms** an **advantage** over gymnosperms because they have better protection. The fruit of **angiosperms** are adapted to facilitate seed dispersal.

On completion of this course, the students will be able to:

1. Recall the history of reproductive biology of angiosperms & recognize the importance of genetic and molecular aspects of flower development
2. Understand structure and functions of anther wall and pollen wall
3. Evaluate the special structures of Ovule
4. Solve Self-incompatibility in Pollination and fertilization & relate between Embryo, Endosperm and Seed
5. Comprehend the causes of Polyembryony and apomixes with its classification

LESSON PLAN FOR SEMESTER V

THEORY

(BOTACOR11T)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER			FROM JULY 2022 TO DECEMBER 2022				HONS √		GENERAL	
SEM	5	Core Course	11		CREDIT POINT	4		Course Code	BOTACOR11T	
Name of the Course			Reproductive Biology of Angiosperms							
Course Co-ordinator			DR. AYANA CHAKRABORTY							
TOTAL MARKS	50	TH	√	TUT			PRAC			
TOTAL HOURS	60 hrs									
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			1							
NAME OF THE UNIT/MODULE			Introduction							
TOTAL HOURS	4 hrs (Adjusted to 3 hrs)	THEORY	√	TUTORIAL			PRAC			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC				HR	TEACHER		MONTH		
1	Introduction, History Reproductive Biology of Angiosperms				1	AC		AUG		
2	Scope of Reproductive Biology of Angiosperms				1	AC		AUG		
3**	Molecular aspects of Reproductive Biology of Angiosperms				1	AC		AUG		
4**										
TOTAL HOURS					3 Hours					

** Alloted total 4 hours adjusted to 3 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			2				
NAME OF THE UNIT/MODULE			Reproductive development				
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Induction of flowering			1	ABJ	AUG	
2	Flower as a modified determinate shoot			1	ABJ	AUG	
3	Flower development, morphological aspects of Flower development			1	ABJ	SEPT	
4	Genetic aspects of Flower development			1	ABJ	SEPT	
5	Molecular aspects of Flower development			1	ABJ	SEPT	
6	QA Discussion			1	ABJ	SEPT	
TOTAL HOURS				6 Hours			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			3				
NAME OF THE UNIT/MODULE			Anther and pollen biology				
TOTAL HOURS	10 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Anther wall: Structure and functions			1	AC	AUG	
2	Microsporogenesis			1	AC	AUG	
3	Callose deposition and its significance			1	AC	AUG	
4	Microgametogenesis			1	AC	AUG	
5	Pollen wall structure			1	AC	AUG	
6	MGU (male germ unit) structure			1	AC	AUG	
7	NPC system			1	AC	SEPT	
8	Palynology and scope			1	AC	SEPT	
9	Pollen wall proteins, pollen viability			1	AC	SEPT	
10	QA discussion			1	AC	SEPT	
TOTAL HOURS				10 Hours			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			4				
NAME OF THE UNIT/MODULE			Ovule				
TOTAL HOURS	10 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Introduction to ovule and it's structure			1	AC	SEPT	
2	Types of ovule			1	AC	SEPT	
3	Structure of female gametophyte			1	AC	SEPT	
4	Megaspороgenesis (Details of Monosporic and Bisporic type)			1	AC	OCT	
5	Megaspороgenesis (Tetrasporic type)			1	AC	OCT	
6	Megagametogenesis (details of <i>Polygonum</i> type)			1	AC	OCT	
7	Organization of mature embryo sac			1	AC	NOV	

8	QA discussion	1	AC	NOV
9	QA discussion	1	AC	NOV
10	Class Test	1	AC	NOV
TOTAL HOURS		10 Hours		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		5					
NAME OF THE UNIT/MODULE		Pollination and fertilization					
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Pollination: types(in brief) and significance			1	ABJ	SEPT	
2	Pollination: characteristics of each type (Anemophily, Hydrophily, Zoophily)with examples.			1	ABJ	NOV	
3	Pollination: characteristics of each type (Malacophily,Ornithophily)with examples.			1	ABJ	NOV	
4	Adaptations of pollination mechanism			1	ABJ	NOV	
5	Structure of style and stigma			1	ABJ	DEC	
6	Path of pollen tube in pistil, Double fertilization						
TOTAL HOURS				6 Hours			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		6					
NAME OF THE UNIT/MODULE		Self incompatibility					
TOTAL HOURS	10 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Basic concepts of Sel- incompatibility			1	AC	NOV	
2	Interspecific, Intraspecific, Homomorphic, Heteromorphic self-incompatibility			1	AC	NOV	
3	GSI and SSI			1	AC	NOV	
4	Methods to overcome self-incompatibility			1	AC	NOV	
5	Mixed pollination			1	AC	NOV	
6	Bud pollination & Stub pollination			1	AC	NOV	
7	Intra-ovarian and <i>in vitro</i> pollination			1	AC	NOV	
8	Parasexual hybridization			1	AC	NOV	
9	Cybrids and <i>in vitro</i> fertilization.			1	AC	DEC	
10	Class test			1	AC	DEC	
TOTAL HOURS				10 HRS			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			7			
NAME OF THE UNIT/MODULE			Embryo, Endosperm and Seed			
TOTAL HOURS	10 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Structure and types of Embryo and Endosperm			1	AC	DEC
2	Structure and types of seed			1	AC	DEC
3	General pattern of development of Dicot embryo and endosperm			1	AC	DEC
4	General pattern of development of monocot embryo and endosperm			1	AC	DEC
5	Suspensor - structure and functions			1	AC	DEC
6	Embryo-endosperm relationship, Nutrition of embryo			1	AC	DEC
7	Unusual features; embryo development in <i>Capsella bursa-pastoris</i> seed structure			1	AC	DEC
8	Importance of Embryo and Endosperm			1	AC	DEC
9	Seed dispersal mechanisms.			1	AC	DEC
10	QA discussion			1	AC	DEC
TOTAL HOURS				10 Hours		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			8			
NAME OF THE UNIT/MODULE			Polyembryony and apomixis			
TOTAL HOURS	4 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Introduction to Polyembryony and apomixis			1	ABJ	DEC
2	Classification and causes of Polyembryony			1	ABJ	DEC
3	Classification and causes of apomixis			1	ABJ	DEC
4	Applications of Polyembryony and apomixis			1	AC	DEC
TOTAL HOURS				4 Hours		

LESSON PLAN FOR SEMESTER V

PRACTICAL

Core Course XI

Reproductive Biology of Angiosperms (BOTACOR11P)

(CREDIT: 2)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS		GENERAL	
							√			
SEM	5	Core Course		11			CREDIT POINT	2	Course Code	BOTACOR11P
Name of the Course			Reproductive Biology of Angiosperms							
Course Co-ordinator			DR. AYANA CHAKRABORTY							
TOTAL MARKS	25	TH			TUT			PRAC	√	
TOTAL HOURS	60	TH			TUT			PRAC	√	
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC										
NAME OF THE UNIT/MODULE			Reproductive Biology of Angiosperms Practical							
TOTAL HOURS	60 HRS 58 HRS	THEORY			TUTORIAL		PRAC		√	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC						HR	TEACHER	MONTH	
	Unit 1									
1.	Anther: Study of Tapetum (amoeboid and glandular) through slides/micrographs/ photographs/ ppt.						2	AC	AUG	
2.	Anther: Study of spore tetrads, uninucleate, bicelled and dehisced anther						2	AC	AUG	

	stages through slides/micrographs photographs / photographs/ ppt.			
3.	Anther: Study of male germ unit (MGU) through photographs and schematic representation.	2	AC	AUG
	Unit 2: Pollen grains			
4.	Fresh and acetolyzed pollen showing ornamentation.	2	AC	AUG
5.	Fresh and acetolyzed pollen showing	2	AC	AUG
6.	Fresh and acetolyzed showing monads, dyads, polyads, pollinia (slides/photographs and fresh material)	2	AC	SEPT
7.	Fresh pollen showing polyads and pollinia			SEPT
8.	Ultrastructure of pollen wall (micrograph)	2	AC	SEPT
9.	Pollen viability: Tetrazolium test germination	2	AC	SEPT
10.	Pollen viability: Tetrazolium test germination....repeat practical			SEPT
11.	Calculation of percentage germination in different media using hanging drop method	2	AC	SEPT
12.	Calculation of percentage germination in different media using hanging drop method....repeat practical	2	AC	SEPT
	Unit 3: Ovule			
13.	Study of ovule Types- anatropous, orthotropous (permanent slides/specimens/photographs).	2	AC	OCT
14.	Study of ovule Types- amphitropous/campylotropous, circinotropous (permanent slides/specimens/photographs).	2	AC	NOV
15.	Study of ovule Types- unitegmic, bitegmic (permanent slides/ specimens/ photographs).	2	AC	NOV
16.	Study of ovule Types- Tenuinucellate and crassinucellate (permanent slides/ specimens/ photographs).	2	AC	NOV
17.	Study of Special structures: Endothelium, obturator, hypostase (permanent slides/specimens/ photographs).	2	AC	NOV
18.	Study of Special structures: caruncle and aril (permanent slides/specimens/photographs).	2	AC	NOV
	Unit 4: Female gametophyte			
19.	Study of Female gametophyte through permanent slides/ photographs: Types.	2	AC	NOV
20.	Study of Female gametophyte through permanent slides/ photographs: Types.	2	AC	NOV
21.	Study of ultrastructure of mature egg apparatus through permanent slides/ photographs.	2	AC	NOV
22.	Unit 5: Endosperms Dissections of developing seeds for endosperm with free-nuclear	2	AC	DEC

	haustoria.			
	Unit:6: Embryogenesis			
23.	Study of dicot embryo through permanent slides/photographs through permanent slide/ photographs;.	2	AC	DEC
24.	Study of embryos at various developmental stages through permanent slide/ photographs	2	AC	DEC
25.	Study of suspensor through electron micrographs/ photographs.	2	AC	DEC
26.	Practice class/ doubt clearing class	2	AC	DEC
27.	Practice class/ doubt clearing class	2	AC	DEC
28.	Practice class/ doubt clearing class	2	AC	DEC
29.	Practice class/ doubt clearing class	2	AC	DEC
30.	Practice class/ doubt clearing class		-	-
	TOTAL	58 HRS		

*** Total 60 Hours adjusted to 58 hours keeping the syllabus unchanged.

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SEM V: CORE COURSE XII

PLANT PHYSIOLOGY

CODE: BOTACOR12T (4 Credits)

COURSE OUTCOME: At the end of this course students will be able to:

- Discuss plant water relations, i.e. how plants acquire, utilize and regulate the flow of water between plant and environment;
- Outline the mineral nutrients plants require, and how they are obtained, metabolized, transported and their role in plants;
- Explain how plant growth regulators regulate the growth and development in plants;
- Describe the physiology of flowering, light responses and seed dormancy in plants

LESSON PLAN FOR SEM V

THEORY

CORE COURSE XII: PLANT PHYSIOLOGY (BOTACOR12T)

*** The allotted total 60 hours for this course has been adjusted to 54 hours, keeping the course content unchanged.

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR BOTANY HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS		GENERAL	
							√			
SEM	5	Core Course	12	CREDIT POINT	4	Course Code	BOTACOR12T			
Name of the Course			PLANT PHYSIOLOGY (CC12)							
Course Co-ordinator			DR. ARUNEEMA BARDHAN							
TOTAL MARKS	50	TH	√	TUT		PRAC				
TOTAL HOURS	60 Hrs (Adjusted to 54 hrs)									
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC				1						
NAME OF THE UNIT/MODULE				Plant-water relations						
TOTAL HOURS	10 hrs (adjusted to 9 hrs)	THEORY	√	TUTORIAL		PRAC				
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	LECTURE HEAD/TOPIC					HR	TEACHER	MONTH		
1	Water potential and its components					1	AB	AUG		
2	Water absorption by roots					1	AB	AUG		
3	Aquaporins					1	AB	AUG		
4	Pathway of water movement, symplast, apoplast					1	AB	AUG		
5	Transmembrane pathways					1	AB	AUG		
6	Root pressure, guttation					1	AB	AUG		
7	Ascent of sap-cohesion -tension theory					1	AB	AUG		
8	Transpiration and factors affecting transpiration, antitranspirants					1	AB	AUG		
9	QA discussion					1	AB	AUG		
10**										
TOTAL						9 Hours				

*** Alloted total 10 hours adjusted to 9 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			2			
NAME OF THE UNIT/MODULE			Mineral Nutrition			
TOTAL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Essential and beneficial elements, macro- and micronutrients			1	AB	AUG
2	Methods of study and use of nutrient solutions			1	AB	SEPT
3	Criteria for essentiality			1	AB	SEPT
4	Mineral deficiency symptoms			1	AB	SEPT
5	Roles of essential elements			1	AB	SEPT
6	Chelating agents			1	AB	SEPT
7	Doubt clearing class			1	AB	SEPT
8**						
TOTAL				7 Hours		

*** Alloted total 8 hours adjusted to 7 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			3			
NAME OF THE UNIT/MODULE			Nutrient Uptake			
TOTAL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Soil as a nutrient reservoir, transport of ions across cell membrane			1	AB	SEPT
2	Passive absorption			1	AB	SEPT
3	Electrochemical gradient			1	AB	SEPT
4	Facilitated diffusion, active absorption			1	AB	SEPT
5	Role of ATP, carrier systems, Proton ATPase pump and ion influx			1	AB	SEPT
6	Uniport, co-transport, symport, antiport			1	AB	SEPT
7	Unit class test			1	AB	SEPT
8**						
TOTAL				7 Hours		

*** Alloted total 8 hours adjusted to 7 hours

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			4			
NAME OF THE UNIT/MODULE			Translocation in the phloem			
TOTAL HOURS	8 hrs (adjusted to 6 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Experimental evidence in support of phloem as the site of sugar translocation			1	AB	SEPT
2	Pressure flow model			1	AB	SEPT
3	Phloem loading and unloading			1	AB	SEPT
4	Source -sink relationship			1	AB	NOV
5	Questions & answers discussion			1	AB	NOV
6	Class Test			1	AB	NOV
7**						
8**						
TOTAL				6 Hours		

*** Alloted total 8 hours adjusted to 6 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			5			
NAME OF THE UNIT/MODULE			Plant Growth Regulators			
TOTAL HOURS	14 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Discovery, chemical nature (basic structure) of auxin			1	AB	NOV
2	Bioassays of auxin, Molecular aspects of the physiological roles of auxin,			1	AB	NOV
3	Discovery, chemical nature (basic structure) of gibberellins			1	AB	NOV
4	Bioassays of gibberellins, Molecular aspects of the physiological roles of gibberellins			1	AB	NOV
5	Discovery, chemical nature (basic structure) of cytokinins			1	AB	NOV
6	Bioassays of cytokinins, Molecular aspects of the physiological roles of cytokinins			1	AB	NOV
7	Discovery, chemical nature (basic structure) of abscissic acid			1	AB	NOV
8	Bioassays of abscissic acid, Molecular aspects of the physiological roles of abscissic acid			1	AB	NOV
9	Discovery, chemical nature (basic structure) of ethylene			1	AB	NOV
10	Bioassays of ethylene, Molecular aspects of the physiological roles of ethylene			1	AB	NOV
11	Brief account of Brassinosteroids			1	AB	NOV
12	Brief account of Jasmonic acid			1	AB	DEC
13	Question Answer discussion			1	AB	DEC
14	Unit class test			1	AB	DEC
TOTAL				14 Hours		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			6			
NAME OF THE UNIT/MODULE			Physiology of flowering			
TOTAL HOURS	6 hrs (adjusted to 5 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Photoperiodism			1	AB	DEC
2	Flowering stimulus			1	AB	DEC
3	Florigen concept, Vernalization			1	AB	DEC
4	Seed dormancy and germination			1	AB	DEC
5	Question Answer discussion			1	AB	DEC
6**	Unit class test			1	AB	DEC
	TOTAL			5 Hours		

*** Alloted total 6 hours adjusted to 5 hours

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			7			
NAME OF THE UNIT/MODULE			Phytochrome, cytochromes and phototropins			
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Discovery, chemical nature of phytochrome, cytochrome and phototropins			1	AB	DEC
2	Role of phytochrome, cytochrome			1	AB	DEC
3	Role of phototropins in photomorphogenesis			1	AB	DEC
4	low energy responses (LER) and high irradiance responses (HIR)			1	AB	DEC
5	Mode of action of phytochrome, cytochrome and phototropins			1	AB	DEC
6	Question Answer discussion			1	AB	DEC
	TOTAL			6 Hours		

*** The allotted total 60 hours for this course has been adjusted to 54 hours, keeping the course content unchanged.

LESSON PLAN FOR SEMESTER V

PRACTICAL

Core Course XII

Plant Physiology

Plant Physiology (BOTACOR12P)

(CREDIT: 2)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS √		GENERAL	
SEM	5	Core Course		12			CREDIT POINT	2	Course Code	BOTACOR12P
Name of the Course			Reproductive Biology of Angiosperms							
Course Co-ordinator			DR. AYANA CHAKRABORTY							
TOTAL MARKS	25	TH				TUT		PRAC	√	
TOTAL HOURS	60	TH				TUT		PRAC	√	
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC					PRACTICAL					
NAME OF THE UNIT/MODULE					Reproductive Biology of Angiosperms Practical					
TOTAL HOURS	60 HRS (adjusted to 58 HRS)		THEORY			TUTORIAL		PRAC	√	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										

SL	TOPIC	HR	TEACHER	MONTH
	Hand on practice experiments			
	Unit 1			
1.	Determination of osmotic potential of plant cell sap by plasmolytic method		AB	AUG
	Unit 2			
2.	Determination of water potential of given tissue (potato tuber) by weight method.	2	AB	AUG
	Unit 3			
3.	Study of the effect of wind on the rate of transpiration in <i>Colocasia</i> leaf.	2	AB	AUG
4.	Study of the effect of light on the rate of transpiration in <i>Colocasia</i> leaf.	2	AB	AUG
	Unit 4			
5.	Calculation of stomatal index and stomatal frequency from the two surface of leaves of a mesophyte (<i>Basella</i>)	2	AB	AUG
6.	Calculation of stomatal index and stomatal frequency from the two surface of leaves of xerophytes (<i>Ficus benghalensis</i>).	2	AB	AUG
	Unit 5			
7.	Determination of the proportion of area covered by stomatal pore with respect to the total leaf area for mesophyte (<i>Basella</i>) (both surfaces).	2	AB	AUG
8.	Determination of the proportion of area covered by stomatal pore with respect to the total leaf area for xerophyte (<i>Ficus benghalensis</i>) (both surfaces).	2	AB	SEPT
	Unit:6			
9.	To study the phenomenon of epigeal seed germination with respect to light (castor seeds).		AB	SEPT
10.	To study the phenomenon of hypogeal seed germination with respect to light (gram seeds).		AB	SEPT
11.	To study the phenomenon of hypogeal seed germination with respect to light (corn seeds).	2	AB	SEPT
	Unit:7			
12.	To study the effect of different concentrations of IAA on <i>Avena</i> coleoptile elongation (IAA bioassay).	2	AB	SEPT
13.	To study the effect of different concentrations of IAA on <i>Avena</i> coleoptile elongation (IAA bioassay). (repeat class)	2	AB	SEPT
	Unit:8			
14.	To study the induction of amylase activity in germinating wheat grains.	2	AB	SEPT
15.	To study the induction of amylase activity in germinating barley grains.	2	AB	OCT
	Demonstration experiments			

16.	To demonstrate suction due to transpiration.	2	AB	NOV
17.	Fruit ripening (demonstration).	2	AB	NOV
18.	Rooting from cuttings (demonstration).	2	AB	NOV
19.	Bolting experiment/ <i>Avena</i> coleptile bioassay (demonstration).	2	AB	NOV
20.	Practice class/ doubt clearing class	2	AB	NOV
21.	Practice class/ doubt clearing class	2	AB	NOV
22.	Practice class/ doubt clearing class	2	AB	NOV
23.	Practice class/ doubt clearing class	2	AB	DEC
24.	Practice class/ doubt clearing class	2	AB	DEC
25.	Practice class/ doubt clearing class	2	AB	DEC
26.	Practice class/ doubt clearing class	2	AB	DEC
27.	Practice class/ doubt clearing class	2	AB	DEC
28.	Practice class/ doubt clearing class	2	AB	DEC
29.	Practice class/ doubt clearing class	2	AB	DEC
30.	Practice class/ doubt clearing class			
TOTAL		58 HRS		

*** Total 60 Hours adjusted to 58 hours.

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SEM V: DISCIPLINE SPECIFIC ELECTIVE COURSE
(NATURAL RESOURCE MANAGEMENT)

CODE: BOTADSE01T (4 Credits)

COURSE OUTCOME: At the end of this course students will be able to:

- Demonstrate an advanced understanding of the application of fundamental principles of ecological studies to the conservation of biodiversity;
- Discuss and cite theories and case studies as prerequisites for success in sustainable utilization and effective species conservation;
- Translate theoretical aspects of contemporary practices to recommendations for environmental management;
- Communicate effectively in the form of written reports and spoken presentations.

LESSON PLAN FOR SEM V
THEORY DSE-1 (BOTADSE01T)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR BOTANY HONS)									
NAME OF THE DEPARTMENT					BOTANY				
HOD		DR. ARUNEEMA BARDHAN							
INITIALS OF FACULTIES		AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022				HONS		GENERAL	
						√			
SEM	5	DSE		01	CREDIT POINT		4	Course Code	BOTADSE01T
Name of the Course		NATURAL RESOURCE MANAGEMENT							
Course Co-ordinator		DR. ARUNEEMA BARDHAN							
TOTAL MARKS	50	TH		√	TUT			PRAC	
TOTAL HOURS	60 (adjusted to 55 hrs)								
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			1						
NAME OF THE UNIT/MODULE			Natural Resources						
TOTAL HOURS	2 hrs	THEORY		√	TUTORIAL			PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)									
SL	LECTURE HEAD/TOPIC					HR	TEACHER	MONTH	
1	Introduction and definition of Natural Resources					1	ABJ	AUG	
2	Types of Natural Resources					1	ABJ	AUG	
TOTAL					2 Hours				

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			2						
NAME OF THE UNIT/MODULE			Sustainable Utilization						
TOTAL HOURS	8 hrs (adjusted to 7 hrs)	THEORY		√	TUTORIAL			PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)									
SL	LECTURE HEAD/TOPIC					HR	TEACHER	MONTH	
1	Concept of sustainable utilization					1	AB	AUG	
2	Economic approaches of sustainable utilization					1	AB	AUG	
3	Ecological approaches of sustainable utilization					1	AB	AUG	
4	Ecological approaches of sustainable utilization (contnd.)					1	AB	AUG	
5	Social approaches of sustainable utilization					1	AB	AUG	
6	Cultural approaches of sustainable utilization					1	AB	AUG	
7	Q & A discussion class					1	AB	SEPT	
8**									
TOTAL					7 Hours				

*** Alloted total 8 hours for unit-2 is adjusted to 7 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		3				
NAME OF THE UNIT/MODULE		Land				
TOTAL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC	HR	TEACHER	MONTH		
1	Utilization of agricultural land	1	ABJ	AUG		
2	Utilization of pastoral land	1	ABJ	AUG		
3	Utilization of horticultural land	1	ABJ	AUG		
4	Utilization of silvicultural land	1	ABJ	SEPT		
5	Soil degradation	1	ABJ	SEPT		
6	Soil Management	1	ABJ	SEPT		
7	Q & A discussion class	1	ABJ	SEPT		
8**						
TOTAL		7 Hours				

*** Alloted total 8 hours for unit-3 is adjusted to 7 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		4				
NAME OF THE UNIT/MODULE		Water				
TOTAL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC	HR	TEACHER	MONTH		
1	Concept of water reservoir of nature	1	AB	SEPT		
2	Freshwater-rivers, lakes, ground water	1	AB	SEPT		
3	Fresh water-aquifers, watershed	1	AB	SEPT		
4	Marine water, Estuarine water	1	AB	SEPT		
5	Wetlands	1	AB	SEPT		
6	Threats and management strategies of water	1	AB	SEPT		
7	Questions & answers discussion	1	AB	SEPT		
8**						
TOTAL		7 Hours				

*** Alloted total 8 hours for unit-4 is adjusted to 7 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		5				
NAME OF THE UNIT/MODULE		Biological Resources				
TOTAL HOURS	12 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Biodiversity-definition and types			1	AB	NOV
2	Significance of biodiversity			1	AB	NOV
3	Threats and management strategies of biological resources			1	AB	NOV
4	Management strategies of biological resources			1	AB	NOV
5	Bioprospecting			1	AB	NOV
6	IPR			1	AB	NOV
7	CBD			1	AB	DEC
8	Nation Biodiversity Action Plan			1	AB	DEC
9	Nation Biodiversity Action Plan-Contd.			1	AB	DEC
10	Doubt clearing class			1	AB	DEC
11	Unit class test			1	AB	DEC
12	Bioprospecting			1	AB	DEC
	TOTAL			12 Hours		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		6				
NAME OF THE UNIT/MODULE		Forests				
TOTAL HOURS	6 hrs (adjusted to 5 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Definition of Forest and Cover			1	ABJ	SEPT
2	Significance of forests with special reference to India			1	ABJ	SEPT
3	Major and minor forest products			1	ABJ	SEPT
4	Depletion of forests			1	ABJ	SEPT
5	Management of forests			1	ABJ	SEPT
6**						
	TOTAL			5 Hours		

*** Alloted total 6 hours for unit-6 is adjusted to 5 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		7				
NAME OF THE UNIT/MODULE		Energy				
TOTAL HOURS	6 hrs (adjusted to 5 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	Renewable sources of energy			1	ABJ	OCT

2	Renewable sources of energy (contnd..)	1	ABJ	NOV
3	Non-renewable sources of energy	1	ABJ	NOV
4	Doubt clearing class & QA discussion	1	ABJ	NOV
5	Class test	1	ABJ	NOV
TOTAL		5 Hours		

*** Alloted total 6 hours for unit-7 is adjusted to 5 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		8				
NAME OF THE UNIT/MODULE		Contemporary practices in resource management				
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	EIA,			1	ABJ	NOV
2	GIS			1	ABJ	NOV
3	Participatory Resource Appraisal			1	ABJ	NOV
4	Ecological footprint with emphasis on carbon footprint			1	ABJ	DEC
5	Resource accounting			1	ABJ	DEC
6	Waste management			1	ABJ	DEC
Total				6 Hours		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		9				
NAME OF THE UNIT/MODULE		National and international efforts in resource management and conservation				
TOTAL HOURS	4 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/TOPIC			HR	TEACHER	MONTH
1	IUCN, UNESCO, UNEP			1	ABJ	DEC
2	IBIN, WBBDB			1	ABJ	DEC
3	BSI, ZSI			1	ABJ	DEC
4	Doubt clearing class and QA discussion			1	ABJ	DEC
Total				4 Hours		

LESSON PLAN FOR SEMESTER V

PRACTICAL

Discipline Specific Elective Course- 1

Natural Resource Management (BOTADSE01P)

(CREDIT: 2)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS		GENERAL	
							√			
SEM	5	DSE		01	CREDIT POINT		2	Course Code	BOTADSE01P	
Name of the Course			Natural Resource Management							
Course Co-ordinator			DR. AYANA CHAKRABORTY							
TOTAL MARKS		25	TH		TUT		PRAC	√		
TOTAL HOURS		60 Hrs								
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC						PRACTICAL				
NAME OF THE UNIT/MODULE						Natural Resource Management Practical				
TOTAL HOURS		60 HRS (adjusted to 54 HRS)		THEORY		TUTORIAL		PRAC	√	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC					HR	TEACHER	MONTH		
	Unit 1									
1.	Estimation of solid waste generated by a domestic system (biodegradable)					2	AB	AUG		
2.	Estimation of solid waste generated by a domestic system (biodegradable).... Repeat practical					2		AUG		
3.	Estimation of solid waste generated by a domestic system (non biodegradable)					2	AB	AUG		

4.	Estimation of solid waste generated by a domestic system (non biodegradable)..... repeat practical	2		AUG
	Unit 2			
5.	Collection of data on vegetation covers of specific area	2	AB	AUG
6.	Collection of data on vegetation covers of specific area repeat practical			SEPT
	Unit 3			
7.	Measurement of dominance of woody species by DBH (diameter at breast height) method	2	AB	SEPT
8.	Measurement of dominance of woody species by DBH (diameter at breast height) method repeat practical			SEPT
	Unit 4			
9.	Calculation and analysis of ecological footprint.	2	AB	SEPT
10.	Practice class/ doubt clearing class	2	AB	SEPT
11.	Practice class/ doubt clearing class	2	AB	SEPT
12.	Practice class/ doubt clearing class	2	AB	SEPT
13.	Practice class/ doubt clearing class	2	AB	SEPT
14.	Practice class/ doubt clearing class	2	AB	SEPT
15.	Practice class/ doubt clearing class	2	AB	NOV
16.	Practice class/ doubt clearing class	2	AB	NOV
17.	Practice class/ doubt clearing class	2	AB	NOV
18.	Practice class/ doubt clearing class	2	AB	NOV
19.	Practice class/ doubt clearing class	2	AB	NOV
20.	Practice class/ doubt clearing class	2	AB	NOV
21.	Practice class/ doubt clearing class	2	AB	DEC
22.	Practice class/ doubt clearing class	2	AB	DEC
23.	Practice class/ doubt clearing class	2	AB	DEC
24.	Practice class/ doubt clearing class	2	AB	DEC
25.	Practice class/ doubt clearing class	2	AB	DEC
26.	Practice class/ doubt clearing class	2	AB	DEC
27.	Practice class/ doubt clearing class	2	AB	DEC
28.	Practice class/ doubt clearing class	-	-	-
29.	Practice class/ doubt clearing class	-	-	-
30.	Practice class/ doubt clearing class	-	-	-
	TOTAL	54 HRS		

*** Total 60 Hours adjusted to 54 hours.

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LESSON PLAN FOR SEMESTER V

Discipline Specific Elective Course- 2

Industrial and Environmental Microbiology (BOTADSE03T)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR BOTANY HONS)											
NAME OF THE DEPARTMENT					BOTANY						
HOD		DR. ARUNEEMA BARDHAN									
INITIALS OF FACULTIES		AC	AB	SDG	SS	ABJ	GL				
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS		GENERAL		
							√				
SEM	5	DSE	03	CREDIT POINT		4	Course Code		BOTADSE03T		
Name of the Course				Industrial and Environmental Microbiology							
Course Co-ordinator				DR. ARUNEEMA BARDHAN							
TOTAL MARKS	50			TH	√	TUT		PRAC			
TOTAL HOURS	60 (adjusted to 53 hrs)										
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC				1							
NAME OF THE UNIT/MODULE				Scope of microbes in industry and environment							
TOTAL HOURS	6 hrs (adjusted to 4 hrs)			THEORY	√	TUTORIAL		PRAC			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)											
SL	LECTURE HEAD/TOPIC					HR	TEACHER		MONTH		
1	Introduction to Industrial and Environmental microbiology					1	AC		AUG		
2	Scope of microbiology in industry					1	AC		AUG		
3	Scope of microbiology in environment					1	AC		AUG		
4	QA discussion					1	AC		SEPT		
5											
6											
TOTAL					4 Hours						

** Allotted total 6 hours for unit-1 is adjusted to 4 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			2			
NAME OF THE UNIT/MODULE			Bioreactors/Fermenters and fermentation processes			
TOTAL HOURS	12 hrs (adjusted to 10 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Fermentation: Solid-state (stationary and submerged) fermentations			1	SS	AUG
2	Fermentation: liquid-state (stationary and submerged) fermentations			1	SS	AUG
3	Batch and continuous fermentations			1	SS	AUG
4	Components of a typical bioreactor			1	SS	AUG
5	Types of bioreactors-laboratory and pilot scale fermenters			1	SS	AUG
6	Types of bioreactors- production fermenters			1	SS	AUG
7	Types of bioreactors-Constantly stirred tank fermenter, tower fermenter			1	SS	AUG
8	Types of bioreactors-fixed bed and fluidized bed bioreactors			1	SS	AUG
9	Types of bioreactors -Air-lift fermenter			1	SS	SEPT
10	QA discussion			1	SS	SEPT
11						
12						
TOTAL				10 HOURS		

A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations.

** Allotted total 12 hours for unit-2 is adjusted to 10 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		3			
NAME OF THE UNIT/MODULE		Microbial production of industrial products			
TOTAL HOURS	12 hrs (adjusted to 11 hrs)	THEORY	√	TUTORIAL	PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)					
SL	LECTURE HEAD/ TOPIC	HR	TEACHER	MONTH	
1	Microorganisms involved in industrial production process	1	AC	SEPT	
2	Media used.	1	AC	SEPT	
3	Fermentation conditions, downstream processing and uses	1	AC	OCT	
4	Filtration, centrifugation	1	AC	NOV	
5	Solvent extraction,, cell disruption	1	AC	NOV	
6	Precipitation and ultrafiltration	1	AC	NOV	
7	Lyophilization, spray drying	1	AC	NOV	
8	Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme: amylase or lipase activity	1	AC	DEC	
9	Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Organic acid: citric acid or glutamic acid	1	AC	DEC	
10	Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of alcohol (Ethanol)	1	AC	DEC	
11	Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of antibiotic Penicillin	1	AC	DEC	
12					
TOTAL					11 hrs

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			4			
NAME OF THE UNIT/MODULE			Microbial enzymes of industrial interest and enzyme immobilization			
TOTAL HOURS	8 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Microorganisms for industrial applications			1	SS	SEPT
2	Hands on screening microorganisms for casein hydrolysis;			1	SS	SEPT
3	Hands on screening microorganisms starch hydrolysis			1	SS	SEPT
4	Hands on screening microorganisms cellulose hydrolysis			1	SS	SEPT
5	Methods of immobilization, advantages and applications of immobilization,			1	SS	SEPT
6	large scale applications of immobilized enzymes (glucose isomerase).			1	SS	SEPT
7	large scale applications of immobilized enzymes (penicillin acylase).			1	SS	NOV
8	Doubt clearing class			1	SS	NOV
TOTAL				8 HOURS		

*** Screening methodology to be practiced using online platform/ and video mode.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			5			
NAME OF THE UNIT/MODULE			Microbes and quality of environment			
TOTAL HOURS	6 hrs (adjusted to 5 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Distribution of microbes in air			1	SS	NOV
2	Isolation of microorganisms from soil			1	SS	NOV
3	Isolation of microorganisms from air			1	SS	NOV
4	Isolation of microorganisms from water			1	SS	NOV
5	Class Test			1	SS	DEC
6**						
TOTAL				5 HOURS		

** Alloted total 6 hours for unit-5 is adjusted to 5 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		6				
NAME OF THE UNIT/MODULE		Microbial flora of water				
TOTAL HOURS	8 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC	HR	TEACHER	MONTH		
1	Water pollution	1	GL	AUG		
2	Role of microbes in sewage water treatment systems	1	GL	AUG		
3	Role of microbes in domestic waste water treatment systems	1	GL	AUG		
4	Determination of BOD, COD of water samples	1	GL	SEPT		
5	Determination of TDS and TOC of water samples	1	GL	SEPT		
6	Microorganisms as indicators of water quality,	1	GL	SEPT		
7	Check coliform and faecal coliform in water samples	1	GL	SEPT		
8	QA discussion	1	GL	OCT		
TOTAL		8 HOURS				

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		7				
NAME OF THE UNIT/MODULE		Microbes in agriculture and remediation of contaminated soils.				
TOTAL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC	HR	TEACHER	MONTH		
1	Brief idea about microbes in agriculture and remediation process	1	GL	NOV		
2	Biological fixation	1	GL	NOV		
3	Mycorrhizae	1	SS	DEC		
4	Bioremediation of contaminated soils	1	SS	DEC		
5	Isolation of root nodulating bacteria	1	SS	DEC		
6	Arbuscular mycorrhizal colonization in plant roots	1	SS	DEC		
7	Doubt clearing class	1	SS	DEC		
8						
TOTAL		7 HOURS				

** Alloted total 8 hours for unit-7 is adjusted to 7 hours.

*** The allotted total 60 hours for this course has been adjusted to 53 hours, keeping the course content unchanged.

LESSON PLAN FOR SEMESTER V

Discipline Specific Elective Course- 2 Practical

Industrial and Environmental Microbiology (BOTADSE03P)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ	GL		
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS		GENERAL	
							√			
SEM	5	DSE		02	CREDIT POINT		2	Course Code	BOTADSE03P	
Name of the Course			Industrial and Environmental Microbiology							
Course Co-ordinator			DR. AYANA CHAKRABORTY							
TOTAL MARKS	25	TH		TUT		PRAC	√			
TOTAL HOURS	60	TH		TUT		PRAC	√			
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			PRACTICAL							
NAME OF THE UNIT/MODULE			Industrial and Environmental Microbiology Practical							
TOTAL HOURS	60 HRS	THEORY			TUTORIAL			PRAC	√	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC						HR	TEACHER	MONTH	
	Unit 1									
1.	Principles and functioning of instruments (Microscope and Autoclave) in microbiology laboratory						2	SS	AUG	
2.	Principles and functioning of instruments (Hot air oven and Laminar air flow) in microbiology laboratory						2	SS	AUG	
3.	Principles and functioning of instruments (Incubator and Deep freezer) in microbiology laboratory						2	SS	AUG	
4.	Principles and functioning of instruments (Bunsen burner, hot plate and water bath) in microbiology laboratory						2	SS	SEPT	
5.	Principles and functioning of instruments (magnetic stirrer and micro pipette) in microbiology laboratory						2	SS	SEPT	

6.	Principles and functioning of instruments (Spectrophotometer and pH meter) in microbiology laboratory	2	SS	SEPT
7.	Principles and functioning of instruments (Water distiller and Vortex mixture) in microbiology laboratory (through video/ ppt. only)	2	SS	SEPT
8.	Principles and functioning of instruments (Analytical balance and Colony counter) in microbiology laboratory	2	SS	OCT
9.	Principles and functioning of instruments (Homogenizer and Centrifuge) in microbiology laboratory (through video/ ppt. only)	2	SS	NOV
	Unit 2			
10.	Hands on sterilization techniques.	2	SS	NOV
11.	Preparation of culture media (PDA)	2	SS	NOV
12.	Preparation of culture media(NA)	2	SS	NOV
13.	Practice class/ doubt clearing class	2	SS	DEC
14.	Practice class/ doubt clearing class	2	SS	DEC
15.	Practice class/ doubt clearing class	2	SS	DEC
16.	Practice class/ doubt clearing class		GL	
17.	Practice class/ doubt clearing class		GL	
18.	Practice class/ doubt clearing class		GL	
19.	Practice class/ doubt clearing class		GL	
20.	Practice class/ doubt clearing class		GL	
21.	Practice class/ doubt clearing class		GL	
22.	Practice class/ doubt clearing class		GL	
23.	Practice class/ doubt clearing class		GL	
24.	Practice class/ doubt clearing class		GL	
25.	Practice class/ doubt clearing class		GL	
26.	Practice class/ doubt clearing class		GL	
27.	Practice class/ doubt clearing class		GL	
28.	Practice class/ doubt clearing class		GL	
	TOTAL		30 HRS	

*** Total 60 Hours adjusted to 30 hours.

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