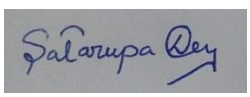
Program Outcomes, Program Specific Outcomes and Course Outcomes of B.Sc. (General) in Botany Programme

Programme Outcomes: B.Sc. (General) in Botany Programme:

PO 1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
PO 2: Problem solving (Ap): Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, apply one's learning to real life situations.
PO 3: Critical thinking (An): Capability to apply analytic thought to a body of knowledge; analyses and evaluate evidence, arguments, claims.
PO 4: Research-related skills / Scientific reasoning: A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause-and-effect relationships.
PO 5: Communication Skills (U/A): Ability to express thoughts and ideas effectively in writing and orally.
PO 6: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.
PO 7: Information/digital literacy: Capability to use ICT in a variety of learning situations.
PO 8: Self-directed learning: Ability to work independently, identify appropriate resources required for a project.
PO 9: Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
PO 10: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives.
PO 11: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team.
PO 12: Lifelong learning: Ability to acquire knowledge and skills, including "learning how to learn", that are necessary for participating in learning activities throughout life.



Programme Specific Outcomes: B.Sc. in Botany

In the modern era, the field of botany has expanded far beyond its classical roots, requiring botanists to possess a comprehensive understanding of various aspects of plant science. A contemporary botany program aims to equip students with the knowledge and skills needed to compete on a global scale, preparing them for further studies in modern biology and related or multidisciplinary fields.

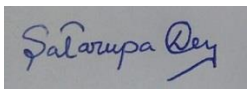
Model Reference: University of Calcutta, Syllabus for Botany General under CBCS system

PSO1: Develop a comprehensive knowledge and understanding of plant diversity, including algae, fungi, bryophytes, pteridophytes and other aspects of plant science.

PSO2: Apply botanical knowledge and techniques to solve real-world problems related to plant science, agriculture, environmental conservation, and biotechnology.

PSO 3: Analyse botanical and ecological concepts, research findings, and scientific arguments using digital tools and information technology effectively and foster the ability to work collaboratively in diverse teams.

PSO 4: Evaluate ethical principles in conducting botanical research, considering the environmental, societal, and ethical implications of scientific work.



Course Outcomes: B.Sc. (General) in Botany

The core courses (CC) provide students with a comprehensive understanding of the subject. Through discipline-specific electives (DSE), students will explore the practical applications of the subject in both academic and industrial settings. Additionally, skill enhancement courses (SEC) will help students develop practical skills, preparing them for further academic studies, entrepreneurship, and careers in industry.

SEMESTER–I

CC1- PLANT DIVERSITY I (PHYCOLOGY, MYCOLOGY, PHYTOPATHOLOGY, BRYOPHYTES AND ANATOMY) (BOT-G-CC-1-1-TH & BOT-G-CC-1-1-P)

After Successful completion of this course, students will be able to:

CO-1	Explain the diversity of plant kingdom and their interactions and its importance in our daily life.
CO-2	Identify the tissue organization and anatomy of roots, stems, and leaves in monocots and dicots and describe different types of stomata.
CO-3	Illustrate the life histories of representative algae, fungi and bryophytes.
CO-4	Compare the process of secondary growth in dicot stems and identify anomalies.
CO-5	Evaluate the roles of algae, fungi, lichen, bryophytes in environmental sustainability, agriculture, biotechnology, and industrial applications. Understand and explain fungal symbioses, particularly Mycorrhiza and Lichen, and their ecological significance.

CO-PO Mapping of Paper CC1- **PLANT DIVERSITY I**

Course Outcome	Programme Outcome (PO)												Programme Specific Outcome (PSO1)		
	PO 1:	PO 2:	PO 3:	PO 4.	PO 5:	PO 6:	PO 7:	PO 8:	PO 9:	PO 10:	PO 11:	PO 12:	PSO1	PSO2	PSO3
CO1: Explain the diversity of	3	1	3	1	1	1	0	1	0	3	1	1	3		
CO2: Identify the tissue	3	1	2	1	0	2	2	1	0	1	0	1	1	3	0
CO3: Illustrate the life histories	3	3	0	1	0	1	1	2	3	0	0	0	0	1	3
CO4: Compare the process of	3	1	1	2	2	2	2	3	0	0	0	0	3	0	0
CO5: Evaluate the roles of algae,	3	2	3	3	2	3	2	3	3	3	3	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO: CC7	3.00	1.60	2.25	1.60	1.67	1.80	1.75	2.00	3.00	2.33	2.00	1.00	2.33	2.00	2.00

Saharupa Dey

SEMESTER–2
SEMESTER–3

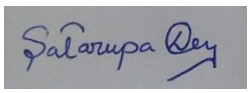
CC3- CELL BIOLOGY, GENETICS AND MICROBIOLOGY (BOT-G-CC-3-3-TH & BOT-G-CC-3-3-P)

After Successful completion of this course, students will be able to:

CO-1	Compare and explain Prokaryotic and eukaryotic cell, structure and functions of cell organelles, DNA packaging, ultrastructure and function of nucleolus and molecular organization of metaphase chromosomes, including the nucleosome concept, and its significance in genome stability and gene regulation.
CO-2	Understand the genetic code, nucleotide sequence, amino acid, transcription, translation genetic mechanisms underlying aneuploidy and polyploidy and their implications in evolution and genetic disorders.
CO-3	Interpret and analyze genetic data to determine the relative positions of genes on chromosomes and understand the concept of linkage groups.
CO-4	Analyse the role of mutagens, both physical and chemical, in inducing genetic mutations and the mechanisms underlying mutagenesis.
CO-5	Evaluate the structure of bacteria and virus, their reproduction and economic importance.

CO-PO Mapping of Paper CC3- CELL BIOLOGY, GENETICS AND MICROBIOLOGY

Course Outcome	Programme Outcome (PO)												Programme Specific Outcome (P		
	PO 1: Disciplinary knowledge :	PO 2: Problem solving	PO 3: Critical thinking	PO 4. Research-related skills / Scientific	PO 5: Communication Skills	PO 6: Cooperation/Team work	PO 7: Information/digital literacy:	PO 8: Self-directed learning	PO 9: Multicultural competence	PO 10: Moral and ethical awarenes	PO 11: Leadership readines s/qualiti	PO 12: Lifelong learning	PSO1	PSO2	PSO3
CO1	3	0	1	1	1	1	0	1	0	0	1	1	3		
CO2	3	0	3	1	0	2	0	1	0	0	0	1	1	3	0
CO3	3	3	2	1	1	1	1	2	2	1	1	0	0	1	3
CO4	3	2	2	3	1	2	2	3	2	2	3	0	3	0	0
CO5	3	2	2	3	2	3	2	3	3	3	3	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO: CC7	3.00	2.33	2.00	1.80	1.25	1.80	1.67	2.00	2.33	2.00	2.00	1.00	2.33	2.00	2.00



SEMESTER–4

CC4- PLANT PHYSIOLOGY AND METABOLISM (BOT-G-CC-4-4-TH & BOT-G-CC-4-4-P)

After Successful completion of this course, students will be able to:

CO-1	Understanding Protein Structure and Enzyme Function and describe the structure of nucleic acids, including DNA and RNA types, enzymes classification, physiological roles of plant growth regulators, role of photoperiodism and plant senescence.
CO-2	Analysis of Plant Transport Mechanisms and Transpiration Process.
CO-3	Categorize and compare the role of pigments in photosynthesis, including their action spectra and the enhancement effect compare mechanisms of C3, C4, and CAM photosynthesis.
CO-4	Explain the biochemical reactions occuring during cellular respiration.
CO-5	Discuss biological dinitrogen fixation and the synthesis of amino acids through reductive amination and transamination.

CO-PO Mapping of Paper CC4- PLANT PHYSIOLOGY AND METABOLISM

Course Outcome	Programme Outcome (PO)												Programme Specific Outcome (PSO1)		
	PO 1:	PO 2:	PO 3:	PO 4.	PO 5:	PO 6:	PO 7:	PO 8:	PO 9:	PO 10:	PO 11:	PO 12:	PSO1	PSO2	PSO3
CO1	3	2	3	1	1	1	0	1	0	1	1	1	3		
CO2	3	2	2	1	0	3	1	1	1	0	2	1	1	3	0
CO3	2	3	2	1	1	1	1	2	2	1	2	0	0	1	3
CO4	3	2	2	3	1	3	2	2	2	1	3	0	3	0	0
CO5	2	2	2	3	2	1	2	2	2	2	3	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO: CO7	2.60	2.20	2.20	1.80	1.25	1.80	1.50	1.60	1.75	1.25	2.20	1.00	2.33	2.00	2.00

Salarupa Dey

SEMESTER–5

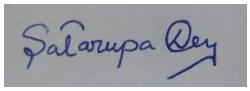
DSE A: (Group A) PHYTOCHEMISTRY AND MEDICINAL BOTANY (BOT-G-DSE-A-5-1-TH & BOT-G-DSE-A-5-1-P)

After Successful completion of this course, students will be able to:

CO-1	Understanding of ethnobotany, its applications in traditional medicine systems and folk medicine practices.
CO-2	Compare Pharmacognosy, primary metabolites and secondary metabolites and their functions and organoleptic evaluation of drugs.
CO-3	Identify the plant sources and therapeutic uses of specific compounds such as diosgenin, digitoxin, catechin, gingerol, curcuminoids, strychnine, reserpine, vinblastine, and capsaicin.
CO-4	Develop concept on buffers, phytochemistry, medicinal botany and polyherbal formulations with their importance in traditional medicine systems.

CO-PO Mapping of Paper DSE A: (Group A) PHYTOCHEMISTRY AND MEDICINAL BOTANY

Course Outcome	Programme Outcome (PO)												Programme Specific Outcome (PSO1)		
	PO 1:	PO 2:	PO 3:	PO 4.	PO 5:	PO 6:	PO 7:	PO 8: Self-	PO 9:	PO 10:	PO 11:	PO 12:	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	1	0	1	0	1	1	1	3		
CO2	3	3	3	1	0	3	1	1	2	2	2	1	1	3	0
CO3	3	3	3	1	3	1	1	2	3	3	2	0	0	1	3
CO4	3	3	3	3	3	3	3	3	3	3	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO: CC7	3.00	3.00	3.00	1.50	2.33	2.00	1.67	1.75	2.67	2.25	2.00	1.00	2.33	2.00	2.00



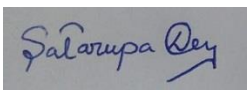
SEC A: PLANT BREEDING AND BIOMETRY (BOT-G-SEC-A-3/5-1)

After Successful completion of this course, students will be able to:

CO-1	Relate the Principles and Objectives of Plant Breeding, techniques of hybridization
CO-2	Explain the advantages and limitations of mass, pure line selection methods and Heterosis in crop improvement programs.
CO-3	Identify the principles and applications of biotechnology tools such as genetic engineering and molecular markers in crop breeding programs.
CO-4	Analyze central tendency such as mean, median, and mode, and statistical tools such as standard error, standard deviation, and chi-square test for goodness of fit.

CO-PO Mapping of Paper **SEC A: PLANT BREEDING AND BIOMETRY**

Course Outcome	Programme Outcome (PO)												Programme Specific Outcome (PSO1)		
	PO 1:	PO 2:	PO 3:	PO 4.	PO 5:	PO 6:	PO 7:	PO 8: Self-	PO 9:	PO 10:	PO 11:	PO 12:	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	1	0	1	0	3	1	1	3		
CO2	3	3	3	1	0	3	2	1	1	3	2	1	1	3	0
CO3	3	3	3	1	3	1	1	2	3	3	2	0	0	1	3
CO4	3	3	3	3	3	3	3	3	3	3	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO: CC7	3.00	3.00	3.00	1.50	2.33	2.00	2.00	1.75	2.33	3.00	2.00	1.00	2.33	2.00	2.00



SEMESTER–6

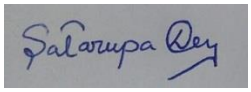
DSE B: HORTICULTURAL PRACTICES AND POST HARVEST TECHNOLOGY (BOT-G-DSE-B-6-4-TH & BOT-G-DSE-B-6-4-P)

After Successful completion of this course, students will be able to:

CO-1	Understand different horticultural practices and post harvest technology
CO-2	Build the basic concept of ornamental plants and learn production, origin and distribution; management and marketing of vegetable and fruit crops.
CO-3	Compare Basic concept of Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures.
CO-4	Develop the knowledge on the nursery, vegetable garden, crop site and cold storage.

CO-PO Mapping of Paper DSE B: HORTICULTURAL PRACTICES AND POST HARVEST TECHNOLOGY

Course Outcome	Programme Outcome (PO)												Programme Specific Outcome (PSO1)		
	PO 1:	PO 2:	PO 3:	PO 4.	PO 5:	PO 6:	PO 7:	PO 8: Self-	PO 9:	PO 10:	PO 11:	PO 12:	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	1	0	1	0	3	1	1	3		
CO2	3	3	3	1	0	3	3	1	2	3	3	1	1	3	0
CO3	3	3	3	1	3	1	1	2	3	3	3	3	3	1	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO: CC7	3.00	3.00	3.00	1.50	2.33	2.00	2.33	1.75	2.67	3.00	2.50	2.00	2.50	2.00	2.00



SEC B: MUSHROOM CULTURE TECHNOLOGY (BOT-G-SEC-D-4/6-4)

After Successful completion of this course, students will be able to:

CO-1	Understand the knowledge of edible and poisonous mushroom in case of physical situation in field.
CO-2	Identify and cultivate various species of mushrooms.
CO-3	Categorize between the species which can be cultivated during winter and spring season.
CO-4	Construct mushroom bed depending on the species and weather conditions.

CO-PO Mapping of Paper SEC B: MUSHROOM CULTURE TECHNOLOGY

Course Outcome	Programme Outcome											
	PO 1:	PO 2:	PO 3:	PO	PO 5:	PO 6:	PO 7:	PO 8: Self-	PO 9:	PO 10:	PO 11:	PO 12:
CO1	3	3	2	1	2	3	3	3	0	3	3	3
CO2	3	3	2	2	2	3	3	3	0	3	3	3
CO3	3	3	3	3	2	3	3	3	0	3	3	3
CO4	3	1	3	3	3	3	3	3	0	3	3	3
CO5	0	0	0	0	0	0	0	0	0	0	0	0
CO6	0	0	0	0	0	0	0	0	0	0	0	0
CO	3.00	2.50	2.50	2.25	2.25	3.00	3.00	3.00	0.00	3.00	3.00	3.00