ST. XAVIER'S COLLEGE (AUTONOMOUS)

AHMEDABAD

Botany Syllabus
for
Four-Year Undergraduate Programme
as per
National Education Policy (NEP-2020)
(Semester IV)

(EFFECTIVE FROM JUNE 2024)

ST. XAVIER'S COLLEGE (Autonomous), AHMEDABAD
BOTANY
Theory syllabus

PROGRAMME SPECIFIC OUTCOMES

PSO1: Knowledge: Understanding the nature and basic concepts of all the plant groups, their morphonology, anatomy, taxonomy, physiology, biochemistry, genetics, components at the molecular level, the relationship between structure and function, plant diversity, and ecology.

PSO2: **Laboratory skills**: Students learn to carry out practical work in the field and in the laboratory related to interpreting plant morphology and anatomy, plant identification and collection, vegetation analysis techniques, physiochemical analyses of plant materials, analysis of data using appropriate statistical methods, documentation of field visits, visits to gardens and nurseries.

PSO3: **Environmental concern**: Students become aware of natural resources and understand the impact of plant diversity in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development with respect to assessment, conservation andnutilization of floral diversity.

PSO4: **Employability/future prospects**: Students develop critical thinking, scientific attitudes, problem-solving skills, presentation skills, teamwork capacities, and an aptitude that is highly valuable to employers in the sector of academia, research and industry and which will facilitate them for taking up and shaping successful careers in Botany.

PSO5: **Scientific communication**: Effective written and oral scientific communication skills, especially the ability to transmit the fundamental concepts of the subject in a clear and concise manner.

PSO6: Life-long learning: Students are prepared for lifelong learning by drawing attention to the vast world of knowledge of plants and by enhancing their ability to engage in independent learning by introducing them to the methodology of systematic academic inquiry.

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The syllabus for Semester IV of the following department under the Faculty of Science based on Under Graduate Curriculum Framework - 2023 will be implemented from the Academic Year 2024-25.

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

Course	Title	Content	Hours /week	Credit
DSC-1 (Theory)	Basics of Botany-V	U-1: Gymnosperms U-2: Plant Geography and Forestry U-3: Plant Physiology I U-4: Plant Physiology II	4 hrs	4
DSC-2 (Theory)	Basics of Botany-VI	U-1: Morphology and Taxonomy U-2: Economic Botany U-3: Palynology U-4: Genetics	4 hrs	4
DSC-3 (Lab)	Basics of Botany Practicals-IV	Practical based as per Theory syllabus Paper I and II.	8 hrs	4
SEC	Organic Farming Practices and Certification	https://onlinecourses.swayam2.ac.in/cec25_hs41/preview	2 hrs	2
Minor (Theory)	Essentials of Botany	U-I: Plant Physiology I U-II: Plant Physiology II	2 hrs	2
Minor (Lab)	Essentials of Botany	Practical based as per Theory syllabus	4 hrs	2
AEC		(To be offered by the concerned subject Department)		
VAC		(To be offered by the concerned subject Department)		

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Syllabus of Semester – IV of the following departments under the Faculty of Science based on Under Graduate Curriculum Framework - 2023 to be implemented from the Academic Year 2024-25.

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

B.Sc. (Hons.) Botany

Minor Course: Essentials of Botany-I(Theory)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Pre-requisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
Essentials of Botany-I (BOMN441C)	2	0	2	10 + 2 from a recognized board in any stream	Basics of Biology

LEARNING OBJECTIVES (LO)	
LO-1	To describe the photosynthesis process, including light reactions, and identify factors that impact photosynthetic efficiency.
LO-2	To understand the mechanisms of water absorption and ascent of sap in plants, and identify key macro- and micronutrients along with their functions.
Course OUTCOMES (CO)	
On Completion of this course, the student will be able to	
CO-1	Explain the photosynthesis process and light reactions, identifying factors that influence photosynthetic efficiency.
CO-2	Understand water absorption and ascent of sap in plants, and identify the sources and functions of macro- and micronutrients.

Unit I: PLANT PHYSIOLOGY I

1. Photosynthetic apparatus.
2. Photosynthetic pigments.
3. Light-dependent phases: Photosystems I and II
4. Photophosphorylation: Cyclic and Non-Cyclic.
5. Light-independent phases: Path of Carbon fixation in C_3, C_4 and CAM cycle.
6. Factors affecting Photosynthesis: External and Internal.

Unit II: PLANT PHYSIOLOGY II

1. Absorption of water
    a. Structure of Water Molecule
    b. Physico-chemical properties of water
    c. Mechanism of water absorption
        (i) Active absorption.
        (ii) Passive absorption.
    d. Factors affecting the rate of water absorption.
2. Theories of Ascent of Sap
    a. Root pressure theory
    b. Physical force theory: (i) Capillary action (ii) Atmospheric Pressure and Cohesion- tension theory (Dixon's Theory)
3. Mineral Nutrition in Plants:
    a. Macro and Micronutrients – C, H, O, N, S, P, K, Ca, Fe, Mg, Mn, Zn, B, Cu, Mo Source and Functions.

Suggestive Reading:

- Noggle, Ray G.; Fritz, George J.; *Introductory plant physiology*; 2nd edition; New Delhi: Prentice-Hall Of India Private Limited, 1991.
- Sinha, B.K.; Pandey, S.N.; *Plant Physiology*; 1st edition; New Delhi: Vikas Publishing HousePvt. Ltd., 1981.
- Verma, V.; *Textbook of Plant Physiology*; New Delhi: Ane Books India, 2007.
- Salisbury, Frank B.; Ross, Cleon W.; *Plant Physiology*; 3rd edition, Reprint; New Delhi : CBSPublishers & Distributors , 1986(2001).
- Devlin, Robert M.; Witham, Francis H.; *Plant Physiology*; 4th edition, Indian reprint; Delhi : CBS Publishers & Distributors , 1986(2001).
- Kochhar, P.L.; *A textbook of Plant Physiology*; 7th edition; Delhi: Atma Ram &Sons, 1964.
- Fundamentals of Plant Physiology by Kumar and Purohit; Narosa Publication.

Suggested Online Links/Readings:

https://swayam.gov.in
https://www.iscnagpur.ac.in/knowledge_learning_files/5.7_General_Open_Access_e-Resources.pdf
https://www.tkdl.res.in/tkdl/langdefault/common/Home.asp?GL=Eng
https://ndl.iitkgp.ac.in
https://nptel.ac.in/course.html
www.ncert.in

https://books.google.co.in

Pedagogy:

1. Lecture method with teaching aids.
2. Audio-Visual Teaching mode with Projector Method.
3. Dialogue and context-based class.
4. Assignments, Learning seminars, Class Tests etc.
5. Open Online Sources and Tutorials.

MODE OF EVALUATION:

The evaluation will be divided into two parts.

ASSESSMENT	MARKS
INTERNAL	
Attendance	05
Assignments	05
Continuous Internal Assessment I and II	15
TOTAL	25 marks
EXTERNAL	
End Semester Exam	25 marks

Students will prepare and present (in pairs) a Submission related to the topic of Assignment on assigned topics. These submissions will be presented in the form of PPT/ Activity/Handwritten notes etc. Points for evaluation: Presentation (20%) + Content (20%) + Explanation (20%) + Creativity (20%) + Overall impression (20%).

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FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

BSc. (Hons.) Botany

Minor Course: Essentials of Botany-I (LAB)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Pre-requisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
Essentials of Botany-I (BOMN441C)	2	0	2	10 + 2 from a recognized board in any stream	Basic Knowledge of Biology, identification, observation, and analytical skills

LEARNING OBJECTIVES (LO)	
LO-1	To apply basic experimental skills relevant to plant physiology.
Course OUTCOMES (CO)	
On Completion of this course, the student will be able to	
CO-1	Acquire foundational skills and techniques in Plant Physiology.

Unit-I Plant Physiology-I

i. Demonstration that oxygen evolved in photosynthesis.
ii. To study the Kranz anatomy.
iii. To study Hill Reaction by isolation of Chloroplast.
iv. Separation of Chlorophyll using paper chromatography technique.

Unit-II Plant Physiology-II

i. Conduction of water through xylem (Demonstration only).
ii. Estimation of macronutrients from the given sample.
iii. Estimation of micronutrients from the given sample.
iv. Study of water absorption in plants by Dye method.

PROJECT:

The PROJECT will be **BASED ON SELECTED TOPICS OF THE SYLLABUS.** These are to be presented as an individual project This will be presented as a hand-written report, or a chart/series of charts, or through a PP presentation. The evaluation will include a Viva.

Suggested Readings:

1. Bendre Ashok M.; Ashok Kumar: A Text Book of Practical Botany; Vol 1; Meerut: Rastogi Publications, 2010
2. Practical Botany vol. I & II by Bendre and Kumar, Rastogi Publication
3. Practical Botany by S. C. Santra, Chatterjee and Das, New Central Book Agency.
4. Experimental Plant Ecology by Pratima Kapur and Sudha Rani, CBS Publication

MODE OF EVALUATION:

The evaluation will be divided into two parts.

Sr. No.	Exam Pattern	Internal Exam	External Exam
1	Practical/Performance	20	25
2	Attendance	5	00
	Total	**25 marks**	**25 marks**