ST. XAVIER'S COLLEGE (AUTONOMOUS)

AHMEDABAD

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

(EFFECTIVE FROM JUNE 2025)

ST. XAVIER'S COLLEGE (Autonomous),
AHMEDABADBOTANY
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, 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 ofdata using appropriate statistical methods, documentation of field visits, visits to gardens and nurseries.

PSO3: **Environmental concern**: Students become aware of natural resources and understand theimpact of the plant diversity in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development with respect to assessment, conservation andutilization 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 thevast world of knowledge of plants and by enhancing their ability to engage in independent learningby introducing them to the methodology of systematic academic enquiry.

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester – V of the following department under the Faculty of Sciencebased on Under Undergraduate Curriculum Framework - 2023 to be implemented from the Academic Year 2025-26.

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

Course	Title	Content	Hours /week	Credit
DSC-1 (Theory)	Advanced Botany I	U-1: Algae U-2: Fungi U-3: Bryophyta U-4: Cell Biology and Genetics	4 hrs	4
DSC-2 (Theory)	Advanced Botany II	U-1: Systematic Botany and Ethnobotany U-2: Angiosperms U-3: Embryology U-4: Anatomy	4 hrs	4
DSC-3 (Lab)	Advanced Botany Practicals- I	Practical based on per Theory syllabus Paper I and II.	8 hrs	4
Subject Specific Minor (Theory)	Advanced Botany III	U-1: Plant Physiology U2: Biochemistry	2 hrs	**2**
Subject Specific Minor (Lab)	Advanced Botany III	Practical based on per Theory syllabus	4 hrs	**2**
Minor (Theory)	Essentials of Botany II	U-I: Anatomy U-II: Embryology	2 hrs	2
Minor (Lab)	Essentials of Botany II	Practical based on the syllabus as per theory	4 hrs	2
SEC	Principles of Landscaping & Gardening	As per the Swayam Curriculum	2 hrs	2

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FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

BSc. (Hons.) Botany

MINOR COURSE : MINOR COURSE: Essential of Botany-II (Theory)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
Essentials of Botany II (BOMN552C)	2	0	2	10 + 2 from a recognized board in any stream	Basic Knowledge of Biology

LEARNING OBJECTIVES (LO)	
LO-1	To identify types of vascular bundles and distinguish normal and anomalous secondary growth.
LO-2	To describe micro- and megasporangium development, gametophyte types, and ovule structures.
LO-3	To classify pollination modes and evaluate pollen/spore features using palynological traits.
Course OUTCOMES (CO)	
On Completion of this course, the student will be able to	
CO-1	Understand vascular bundles, stele types, and secondary growth in plants.
CO-2	Explain reproductive structures and development in plant embryology.

CO-3	Analyze pollination types, ovule forms, and pollen/spore morphology.

UNIT I: ANATOMY **(15L)**

1. Types of Vascular Bundles
2. Stellar Evolution and Types of Stele.
3. Normal Secondary Growth (Sunflower root, Sunflower Stem/ *Capparis* Stem).
4. Anomalous Secondary Growth (*Salvadora* Stem).
5. Waste Material
6. Leaf Fall.

Unit II: EMBRYOLOGY **(15L)**

1. Structure & Development of microsporangium and male gametophyte.
2. Structure & Development of megasporangium and female gametophyte.
3. Types of Female Gametophyte: Monosporic, Bisporic, Tetrasporic (Fritillaria type).
4. Structure of ovules and types of ovules.
5. Pollination: Definition, Types, and Agents. Pollination in Salvia and Calotropis.
6. Pollen and Spore morphology- Size and Shape, Polarity, apertures, exine stratification.

Suggestive Reading:

- Chamberlain, Charles Joseph;Coulter, John Merle; Morphology of Gymnosperms; 2ndedition; Allahabad : Central Book Depot , 1964.
- Chamberlain, Charles Joseph; Gymnosperms: structure and evolution; 2nd edition; NewYork : Dover Publications, Inc. , 1966.
- Bhatnagar, S.P.;Moitra, A.; Gymnosperms. ., New Delhi : New Age International Pvt.Ltd., 1996.
- Raghavan, V.;Developmental Biology of Flowering plants; New York: Springer - Verlag,1999.
- Vasishta P.C.,; Botany for degree students- Vol. V, Gymnosperm; Delhi: S. Chand, 1983.
- Chopra G.L., Nagin S.; Gymnosperm; Jullundhar: S. Nagin& Co., 1978.
- Dutta, A.C.; A Class-book of Botany; 15th edition; Calcutta: Oxford University Press,1976.
- Sivarajan, V.V.; Introduction to the principles of plant taxonomy; 2nd edition;Cambridge: Cambridge University Press , 1991.
- Subramanian, N.S.; Modern plant taxonomy; New Delhi : 1st edition; Vikas PublishingHouse Pvt. Ltd. , 1995.
- Lawrence, George H.M.; Taxonomy of Vascular Plants; 1st edition; New Delhi : Oxford& IBH Publishing Co., 1967.
- Sharma, O.P.; Plant Taxonomy; 1st edition, reprint; New Delhi : Tata McGraw-HillPublishing Co. Ltd. , 1993(2002)
- Esau, Katherine; Anatomy of seed plants; 2nd edition; New York : John Wiley & Sons,1977.

- Gangulee, H.C., Das, K.S., Dutta C.T.; College Botany Vol I.; Kolkata: New CentralBook Agency, 2002.
- Naik, V.N. 1984. *Taxonomy of Angiosperms;* New Delhi: Tata McGraw - Hill PublishingCo. Ltd., 1984.

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 seminar, Class Test.
5. Open Online Sources and Tutorials.

MODE OF EVALUATION:

Evaluation will be divided in 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 the Assignment on the allotted 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
Category – IV

MINOR COURSE: Essential of Botany-II (LAB)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
Essentials Of Botany – II (BOMN552C)	2	0	2	10 + 2 from a recognized board in any stream	Basic Knowledge of Biology, observation and analytical skills

LEARNING OBJECTIVES (LO)	
LO-1	To prepare and interpret stained slides of sunflower and Salvadora stems to differentiate normal and anomalous secondary growth.
LO-2	To identify calcium-based waste materials and recognize structural features from slides of vascular bundles and leaf fall.
LO-3	To analyze pollen grains, perform honey pollen analysis, and study stages of gametophyte development through permanent slide observation.

Course OUTCOMES (CO)	
On Completion of this course, the student will be able to	
CO-1	Perform double staining and microscopic preparation of plant tissues showing normal and anomalous secondary growth.
CO-2	Identify plant waste materials, vascular bundles, and study anatomical processes like leaf fall using slides/charts.
CO-3	Observe and analyze pollen morphology, pollen tube development, and ovule structures through permanent slides and samples.

UNIT 1: ANATOMY:

1. Double stain temporary preparation of Sunflower root and Sunflower stem normal secondary growth.
2. Double stain temporary preparation of Salvadora stem for Anomalous secondary growth.

3. Study of Waste Materials:

(a) Calcium oxalate

Raphides [*Colocasia*].

Spheraphides [Opuntia].

(b) Calcium carbonate

Cystolith [Banyan leaf].

4. Study of Leaf fall through permanent slides/Charts
5. Permanent Slide/Charts: Vascular Bundle.

UNIT II: EMBRYOLOGY

1. Study of Pollen Morphology of Hibiscus, Canna, Pancratium, and Ocimum.
2. Pollen Analysis from honey samples.
3. Study of the Development of the pollen tube from the given plant samples.
4. Permanent slide of:
   a. T.S. of Anther,
   b. Types of Ovules.
   c. Female gametophyte.
   d. Embryo sac with MMC; 2/4/8-nucleate Embryo sac**.**

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 handwritten report, or a chart/series of charts, or through a PowerPoint presentation. The evaluation will include a

Viva.

Suggested Reading:

- Practical Botany vol. I & II By Bendre and Kumar, Rastogi Publication.
- Practical Botany by S. C. Santra, Chatterjee and Das, New Central Book Agency.

MODE OF EVALUATION:

SR. NO.	EXAM PATTERN	INTERNAL EXAM	EXTERNAL EXAM
1	Practical/Performance	20	25
2	Attendance	5	00
	Total	**25 marks**	**25 marks**