ST. XAVIER'S COLLEGE (AUTONOMOUS)

AHMEDABAD

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

(EFFECTIVE FROM JUNE 2023)

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, team work 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 – II of the following department under Faculty of Sciencebased on Under Graduate Curriculum Framework - 2023 to be implemented from the Academic Year 2023-24.

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

Course	Title	Content	Hours/ week	Credit
DSC-1 (Theory)	Basics of Botany-II	U-1: Plant Resources, Gardening and Biotechnology U-2: Plant Physiology U-3: Plant Diversity: Study of Higher Plants Gymnosperms U-4: Morphology and Taxonomy of Angiosperms.	4 hrs	4
DSC-1 (Lab)	Basics of Botany Practical-II	Practical syllabus based on Theory	8 hrs	4
Minor (Theory)	Fundamentals of Botany-II	U-1: Plant Diversity: Study of Higher Plants Gymnosperms U-2: Morphology and Taxonomy of Angiosperms	2 hrs	2
Minor (Lab)	Fundamentals of Botany -II	Practical syllabus based on Theory	4 hrs	2
SEC	Herbarium Techniques	U-I: Introduction to Herbarium and Collection U-II: Processing and Maintenance	2 hrs	2
MDC	Plant Biodiversity	U – I: Biodiversity: Global and Indian U– II: Biomes & Natural History U– III: Plant diversity U– IV: Human – Wildlife Interaction	4 hrs	4
AEC		(To be offered by the concerned subject Department)		
VAC		(To be offered by the concerned subject Department)		

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from the Academic Year 2023-24.

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

BSc. (Hons.) Botany

MINOR COURSE : FUNDAMENTALS 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		
Fundamentals of Botany II (BOMN221C)	2	0	2	10 + 2 from a recognized board in any stream	Basic Knowledge of Biology

LEARNING OBJECTIVES (LO)	
LO-1	To differentiate between Gymnosperms and Angiosperms.
LO-2	To understand the life cycles of *Cycas*, Sunflower and Maize and gain knowledge on the Morphology of Angiosperms.
LO-3	To learn about the types of classifications- artificial, Natural and Phylogenetic and know howto classify plants based on Bentham and Hooker's system of Classification
Course OUTCOMES (CO)	
On Completion of this course, the student will be able to	
CO-1	Differentiate between Gymnosperms and Angiosperms and describe the

	life cycles of *Cycas*, Sunflower, and Maize.
CO-2	Discuss the types of classifications- artificial, Natural and Phylogenetic and know howto classify plants based on Bentham and Hooker's system of Classification.

Unit-I: PLANT DIVERSITY: Study of higher plants (15L)

GYMNOSPERMS

1. General characters of Gymnosperms: occurrence, morphology and reproduction.
2. *Cycas*: Occurrence, distribution, taxonomic position, morphology, reproduction and life history of the genus (excluding anatomy).

ANGIOSPERMS

1. General characters of Dicotyledons and Monocotyledons.
2. Sunflower and Maize: Occurrence, distribution, taxonomic position, morphology, reproduction and life history of the genus (excluding anatomy).

Unit-II: MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS (15L)

1. MORPHOLOGY OF ANGIOSPERMS
   a. Stipules: types and modifications.
   b. Types of placentation.
   c. Types of aestivations.
2. TAXONOMY OF ANGIOSPERMS
   a. Introduction to systems of classification—Artificial, Natural and Phylogenetic.
   b. Bentham and Hooker's system of classification. **Merits and Demerits.**
   c. Study of the following families.
      i.) Dicotyledons- Polypetalae – *Malvaceae*
      ii) Dicotyledons- Gamopetalae- *Convolvulaceae*
      iii) Dicotyledons- Apetalae- *Nyctaginaceae*
      iv) Monocotyledons- *Amaryllidaceae*

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 Assignment on 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 : FUNDAMENTALS 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		
Fundamentals Of Botany - II (BOMN221C)	2	0	2	10 + 2 from a recognized board in any stream	Basic Knowledge of Biology, observation and Analytic skills

LEARNING OBJECTIVES (LO)	
LO-1	To perform experimental techniques to analyze selected plants from Gymnosperm andAngiosperm.
LO-2	To understand the distinguishing features and classification of selected Angiosperm families and learn to appreciate their economic importance.
LO-3	To prepare a project on the Career opportunities available in any of the branches of Biology and document florist records of the

	selected area.
Course OUTCOMES (CO)	
On Completion of this course, the student will be able to	
CO-1	Perform experimental techniques to analyze selected plants from Gymnosperm andAngiosperm.
CO-2	Describe the distinguishing features and classification of selected Angiosperm families and recognize to appreciate their economic importance.
CO-3	Prepare a project on the Career opportunities available in any of the branches of Biology.

Unit-1: PLANT DIVERSITY: Study of higher plants

I] Study of Gymnosperms:

1. Study of Gymnosperms- Life-History of *Cycas*
   i. Specimen- Cycas whole plant, coralloid roots, compound leaf, male cone, Megasporophyll and ovules
   ii. Mounting – Cycas microspores
   iii. Permanent slides- T.S Microsporophyll, L.S Ovule

II] Study of Angiosperms:

2. Study of Life History:
   a. Sunflower
      i. Specimens – Whole plant, Inflorescence, Ray floret and Disc floret.

   b. Maize
      i. Specimen – Whole plant, Inflorescence, Seed.
      ii. Slides – LS of Seed.
3. **Study of internal & external Leaf characteristics of Dicotyledon *Ixora* sps. and Monocotyledon *Crinum* sps. plants.**
4. **Study of the stem characteristics of Dicotyledon *Ixora* sps and Monocotyledon *Canna* sps. plants.**
5. **Study of Pollen grain characteristics of Dicotyledon *Ixora* sps and Monocotyledon *Crinum* sps. plants.**

Unit-2 MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS

I] Study of Plant Morphology through charts and fresh specimens.

1. Study of Plant Morphology -I: Types of Placentation.
2. Study of Plant Morphology -II: Types of Aestivation.
3. Study of Plant Morphology -II: Types of Stipules.

II] Study of Plant families: Classification with reasons, identifying characters (general and distinguishing), floral formula and floral diagrams, habit, sketch, androecium, gynoecium, and T.S of the ovary; 3-4 botanical and common names of examples.

1. Study of Plant families- Dicotyledonae: *Polypetalae*: *Malvaceae,*
2. Study of Plant families- Dicotyledonae*: Gamopetalae: Convolvulaceae,*
3. Study of Plant families- Dicotyledonae*: Apetalae: Nyctaginaceae*
4. Study of Plant families- Monocotyledon*: Amaryllidaceae*

PROJECT:

The **PROJECT** will be on the Study of **Campus flora/Visit to Serenity Botanical Garden/Riverfront Flower Show etc**. Students will study the basic plant taxonomy and learn to identify basic families of plant kingdoms. These are to be presented as individual projects in the form of Reports/ PPT etc in a creative manner.

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**