

ST. XAVIER'S COLLEGE (AUTONOMOUS)

AHMEDABAD

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



(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 and utilization 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.

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester – I of the following department under Faculty of Science based 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 |
|--------|---|--|----------------|--------|
| SEC | Microscopy and Histochemical Techniques | U-1: Microscopy U-2: Histochemical techniques | 2 hrs | 2 |

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester –III 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

BSc. (Hons.) Botany

Skill Enhancement Course: Microscopy and Histochemical Techniques

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 | | |
| Microscopy and Histochemical Techniques (BOSE331L) | 2 | 0 | 0 | 10 + 2 from a recognized board in any stream | Basic knowledge of Biology |

LEARNING OBJECTIVES (LO)

| | |
|------|--|
| LO-1 | To learn fundamental skills important for performing laboratory and field experiments. |
|------|--|

Course OUTCOMES (CO)

On Completion of this course, the student will be able to

| | |
|------|--|
| CO-1 | Comprehend the principles, working, and apply knowledge of the functioning of various kinds of microscopes. |
| CO-2 | Demonstrate a comprehensive understanding of various histochemical techniques and they will be proficient in selecting appropriate techniques for staining procedures, interpreting histochemical results, and effectively communicating findings through written reports and presentations. |

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

1. History of the Microscope
2. Lenses and bending of Light
3. Light Microscopy: Principle and applications of the Bright field, Phase Contrast, Dark-field, and Fluorescence light Microscopy.
4. Electron Microscopy: TEM & SEM, its principle, working, and applications
5. Newer Techniques in Microscopy
 - Confocal Microscope.
 - Scanning Probe Microscope

UNIT II: HISTOCHEMICAL TECHNIQUES**(15L)**

1. General account of killing and fixing, Agents used for killing and fixing. Common fixatives Formalin-Acetic-Alcohol, Chromic acid-acetic acid mixture.
2. Dehydration -General account of dehydration (Ethanol, Isopropyl alcohol, Acetone, Glycerine). Ethanol- Xylene series and Tertiary Butyl Alcohol Series.
3. Infiltration- Paraffin Wax method, Embedding.
4. Section technique: types; microtomy
4. Staining: Histochemical Staining and Vital Staining.
5. Mounting: Whole mount, Maceration (of conducting tissues), and Smears (Mitosis).
6. Adhesive for Section, Sealing for medium.

Suggestive Reading:

- Bisen, P.S. (2014). Laboratory Protocols in Applied Life Sciences, 1st edition. CRC Press.
- McGraw, Hill. (2009). Foundations in Microbiology, K. P. Talaro, 7th International edition.
- Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw Hill Publishing Co. Ltd. New Delhi. 3rd edition.
- Ruzin, S.E. (1999). Plant Micro-technique and Microscopy, Oxford University Press, New York. U.S.A
- Jones, A.M., Reed, R., Weyers, J. (2016). Practical Skills in Biology, 6th Edition, Pearson
- Johansen, D.A (1940). Plant Micro-technique. McGraw–Hill Book Company, Inc. New York.
- Kanika, S. (2007). Manual of Microbiology – Tools and Techniques; Ane's student edition.
- Khasim, S.K., (2002). Botanical Micro-technique; Principles and Practice, Capital Publishing Company, New Delhi.
- Toji, T., (2004). Essentials of botanical micro-technique; Chennai: Apex Infotec Publ.

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.tkdil.res.in/tkdil/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
5. Open Online Sources and Tutorials.

MODE OF EVALUATION:

| 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%).