



Syllabus
Second Semester Courses in
BSc
Botany
(November 2023 onwards)

- Core Courses:
 - USBOT4502CR1 Cryptogams
 - USBOT4502CR1PR Cryptogams Practical
- Vocational Skill Course:
 - USBOT4501VS1 Botanic Gardens
- Evaluation and Assessment guidelines

APPROVED SYLLABUS



Shinde.
PRINCIPAL
ST. XAVIER'S COLLEGE
AUTONOMOUS
MUMBAI - 400 001.

FYBSc in Botany		
Course Title: Cryptogams		
Course Code: USBOT4502CR1		
Credits 4: Theory (3) = 45 hrs and Practical (1) = 30 hrs		
No.	Course Objectives	
1.	Understand morphological and anatomical structures of algae, fungi, lichens, bryophytes and pteridophytes.	
2.	Learn and state the meaning of scientific terms commonly used to know cryptogams.	
3.	Perceive the ecological and economic significance of lower plant groups.	
4.	Differentiate between various groups of algae, fungi, bryophytes and pteridophytes.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1.	Know the importance of studying life cycles of type specimens in these plant groups.	Remembering
2.	Understand the basis of classification of lower plant groups.	Understanding
3.	Illustrate the important morphological and anatomical features of <i>Spirogyra</i> , <i>Rhizopus</i> , <i>Riccia</i> and <i>Nephrolepis</i> .	Applying
4.	Distinguish between the major classes of algae, fungi, bryophytes and Pteridophytes.	Analyzing



UNIT I	Algae and Lichens	15 L
1.	Algae: Introduction, general characters and classification. Life cycle of <i>Spirogyra</i> .	(09)
2.	Lichens: Types, nature of association, economic and ecological importance of lichens.	(06)
UNIT II	Fungi	15 L
1.	Fungi characters: Introduction, general characters and classification.	(07)
2.	Life cycle: Life cycle of <i>Rhizopus</i> , Fungal associations in nature.	(08)
UNIT III	Bryophytes and Pteridophytes	15 L
1.	Bryophyta: Introduction, classification, and general characters; Life cycle of <i>Riccia</i> .	(08)
2.	Pteridophyta: Introduction, classification, and general characters. Life cycle of <i>Nephrolepis</i> .	(07)

Reference Books:

1. Alexopoulos, C. J., Mims, C. W., Blackwell, M. M. (1996). Introductory Mycology, Wiley student edition, 4th Edition.
2. Dutta, A.C.; (1976). A Classbook of Botany; 15th edition; Calcutta: Oxford University Press,.
3. Rashid, A., (1998). An introduction to Bryophyta: Diversity, Development and Differentiation, S. Chand, 1st edition,.
4. Sambamurty, A. V. S. S., (2019). A Textbook of Algae, Dreamtech Press.
5. McGrawhill book Comp. Tokyo.
6. Smith, Gilbert M; (1955). Cryptogamic Botany Bryophyta & Pteridophyta Volume 2; 2nd edition; McGraw-hill book Comp. Tokyo,.
7. Smith, Gilbert M; (1955). Cryptogamic Botany Algae & Fungi Volume 1; 2nd edition;
8. Vasishtha B.R. and Sinha, A. K., Singh, V. P. (2021). Botany for degree students ALGAE; S. Chand & Company Ltd, revised edition, revised.
9. Vasishtha B.R., Sinha, A. K., Kumar, Anil. (2016). Botany for degree students FUNGI; S. Chand & Company Ltd, revised edition,.
10. Vasishtha B.R., Sinha, A. K. (2005). Botany for degree students: Bryophyta; S. Chand & Company Ltd, 1st edition, revised.



Evaluation (Core Theory, USBOT4502CR1): Total marks per course - 100.

- I. Formative Assessment 'for' Learning
(continuous internal assessment - CIA to improve learning).
CIA- 40 marks
CIA 1: Written test -20 marks
CIA 2: Test / Assignment / Quiz -20 marks
- II. Summative Assessment 'of' Learning
(focus on outcomes, quantitative data for outcomes of instruction).
End Semester Examination – 60 marks
One question from each unit for 20 marks, with internal choice.
Total marks per question with choice -28 to 30.

Distribution of Bloom's Taxonomy levels for the course assessment

Learning Levels	Remember	Understand	Apply	Analyze
*Percentage	30-40%	30-40%	20-30%	20-30%



FYBSc in Botany		
Course Title: Cryptogams Practical		
Course Code: USBOT4502CR1PR		
Credit(s) 1: = 30 hrs		
No.	Course Objectives	
1.	Understand the economic significance of algae, fungi, and lichens. Identify the roles of these organisms in biotechnology, food industry, and environmental management.	
2.	Describe the morphological characteristics of <i>Spirogyra</i> . Illustrate the different stages of its life cycle, including sexual and asexual reproduction.	
3.	Develop skills in the collection techniques of algal samples from various aquatic habitats. Learn to prepare slides and use microscopes for the observation of algal specimens.	
4.	Observe the morphological structure of <i>Rhizopus</i> . Understand the asexual and sexual phases of the <i>Rhizopus</i> life cycle.	
5.	Identify the vegetative and reproductive structures of <i>Riccia</i> . Comprehend the alternation of generations in <i>Riccia</i> 's life cycle.	
6.	Examine the structure of <i>Nephrolepis</i> ferns. Trace the life cycle stages from spore to mature sporophyte.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1.	Learn about <i>Rhizopus</i> ' role in food industry and scientific research.	Remembering
2.	Acquire understanding of <i>Spirogyra</i> 's reproductive biology. Understand <i>Riccia</i> 's life cycle and its ecological significance.	Understanding
3.	Gain practical knowledge of their economic importance and applications.	Apply
4.	Comprehend the life cycle and environmental adaptations of <i>Nephrolepis</i>	Analyze
3.	Develop field and laboratory skills for algal identification.	Evaluate



S. No. Name of Practical

1. Study of economically important algae, fungi and lichens.
2. Study of stages in the life cycle of *Spirogyra*.
3. Collection and identification of algae from the field.
4. Study of stages in the life cycle of *Rhizopus*
5. Study of stages in the life cycle of *Riccia*.
6. Study of stages in the life cycle of *Nephrolepis*.

Evaluation (Practical, USBOT4502CR1PR): Total marks practical course - 50

CIA - 20 marks

End Semester Practical Examination - 30 marks.

Continuous practical evaluation will be done on the basis on the completion of the hands-on practical sessions

Distribution of Bloom's Taxonomy levels for the practical assessment

Learning Levels	Remember	Understand	Apply	Analyze	Evaluate	Create
*Percentage	25-30%	20-25%	20-25%	20-25%	15-20%	NA



FYBSc in Botany		
Course Title: Botanic Gardens		
Course Code: USBOT4501VS1		
Credits 4: Theory (1) = 15 hrs and Practical (1) = 30 hrs		
No.	Course Objectives	
1.	Understand the historical development and evolution of botanical gardens worldwide.	
2.	Study the role of botanical gardens in conservation efforts, including the preservation of endangered plant species.	
3.	Examine the design and layout of botanical gardens, including plant classification systems and plant collections.	
4.	Apply knowledge acquired in the course through hands-on activities, such as plant propagation, gardening techniques, and participation in citizen science projects.	
5.	Identify plants using key morphological traits. Map plant diversity in an area.	
6.	Use digital tools for ecological studies. Analyze tree life cycle data.	
7.	Observe diverse plant species during field trip. Learn about plant conservation and ecology	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1.	Learn historical significance of botanical gardens, including their role in conservation, education, and research.	Remembering
2.	Understand the fundamental concepts and principles of botanical gardens.	Understanding
3.	Develop skills in identifying and classifying various plant species found in botanical gardens.	Applying
4.	Use the principles of plant ecology and conservation practices in botanical gardens, for the preservation of endangered plant species and habitats. Observe plant diversity during botanical visit, and Recognize importance of conservation.	Analyzing
5.	Utilize Google Earth for mapping.	Evaluate
6.	Understand ecosystem and climate impacts. Collect and interpret phenology data, and analyze plant diversity data.	Create



UNIT I Botanic Gardens	15 L
A. Introduction	
1. Botanical Garden - Introduction and History.	(01)
2. Role of botanical gardens in Taxonomic Studies, Research & conservation, endangered plant species and habitat preservation.	(02)
3. Basic requirements of botanical gardens, types of botanical gardens, ex-situ conservation methods.	(02)
4. Major Botanical Gardens of India, Royal Botanic Gardens, Kew.	(02)
B. Plant data collection and identification	
1. Citizen science projects and data collection.	(01)
2. Basic plant identification techniques.	(03)
3. Taxonomic classification systems.	(02)
4. Botanic Gardens Conservation International (BGCI).	(02)

Reference Books:

1. Bhattacharya B. (2009). Systematic Botany. 2nd Ed., Narosa Publishing House.
2. Mondal A.K. (2005). Advance plant Taxonomy. New Central Book Agency (P) Ltd.
3. Pandey B.P. (2012). A textbook of Botany Angiosperms. S. Chand and Company Ltd.
4. Singh Gurucharan, (2010). Plant Systematics – Theory and Practice 3rd edition.
5. Subrahmanyam, N. S. (1995). Modern plant taxonomy; New Delhi: 1st edition; Vikas Publishing House Pvt. Ltd.

S. No. Name of Practical

1. Study of morphology of leaf and flower parts.
2. Study of Plant identification techniques.
3. Preparation of diversity map for a given plant for a given area using Google earth.
4. Study of tree phenology data.
5. Field trip to a botanical garden.



Evaluation (Theory and Practical, USBOT4501VS1): Total marks per course – 50

Formative Assessment 'for' Learning

(continuous internal assessment - CIA to improve learning- practical).

CIA - 20 marks (Practical portion)

CIA 1: Test (Practical) - 10 marks.

CIA 2: Assignment / as prescribed (Practical) - 10 marks.

Summative Assessment 'of' Learning

(focus on outcomes, quantitative data for outcomes of instruction)

End Semester Examination (Theory portion) - 30 marks

Distribution of Bloom's Taxonomy levels for the course assessment

Learning Levels	Remember	Understand	Apply	Analyze	Evaluate	Create
*Percentage	0-5%	15-20%	20-30%	20-30%	10-20%	5-10%

APPROVED SYLLABUS





Syllabus
Second Semester Courses in
Botany
(June 2023 onwards)

- Open Elective Courses:
 - **USBOT4501OE1 Gardening**
 - **USBOT4502OE1 Plants in Human Nutrition**
- Evaluation and Assessment Guidelines

APPROVED SYLLABUS



Hinde
PRINCIPAL
ST. XAVIER'S COLLEGE
AUTONOMOUS
MUMBAI - 400 001.

FYBA, FYBMS, FYMCJ, FYBAF, FYBCom		
Course Title: Gardening		
Course Code: USBOT4501OE1		
Credits 2: Theory (2) = 30 hrs		
No.	Course Objectives	
1.	Introduce students to the fundamental principles of gardening, including plant selection, soil preparation, and garden design.	
2.	Develop students' understanding of plant care techniques, such as watering, fertilizing, and pest control.	
3.	Provide hands-on experience in cultivating different types of plants, including flowers, vegetables, and herbs.	
4.	Familiarize students with sustainable gardening practices, such as composting, organic gardening methods, and water conservation.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1.	Learn the history, definition, objectives and scope of gardening.	Remembering
2.	Demonstrate an understanding of the basic principles of gardening, including plant selection, soil preparation, and garden layout.	Understanding
3.	Apply appropriate plant care techniques, such as watering, fertilizing, and pest management, to maintain healthy and thriving plants.	Applying
4.	Implement sustainable gardening practices, such as composting, organic pest control, and water-efficient irrigation techniques.	Analyzing
5.	Cultivate a variety of plants, including flowers, vegetables, and herbs, using proper planting methods and maintenance practices.	Evaluating
6.	Design and create aesthetically pleasing gardens, considering factors such as color harmony, plant placement, and focal points.	Creating



UNIT I Basics of gardening	15 L
1. Introduction: History of gardening, definition, objectives and scope.	(04)
2. Types of Gardening: Different types of gardening, home gardening, parks and its components - plant materials and design.	(07)
3. Organic Farming: Definition, scope, Indian scenario, and future scope.	(04)
UNIT II Techniques in gardening	15 L
1. Soil selection, preparation and plantation: Selection of site. Preparation of soils for garden- mulching, top-dressing, blanching. Sowing, transplanting, tree transplanting. Irrigation- overhead, surface, and underground. Weeding and pruning- principles, objectives and general technique.	(08)
2. Cultivation of vegetables: Study of cultivation of different vegetables for home garden: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots. Storage and marketing procedures.	(07)

Reference Books:

1. Breck, J. (2023). *The Flower-Garden*. BoD–Books on Demand.
2. Bose T.K., Mukherjee, D. (1972). *Gardening in India*, New Delhi, Delhi: Oxford & IBH Publishing Co.
3. Jules, J. (1979). *Horticultural Science*, 3rd edition, San Francisco, California: W.H. Freeman and Co.
4. Kumar, N. (1997). *Introduction to Horticulture*. Nagercoil, Tamil Nadu: Rajalakshmi Publication
5. Weiner, A. (2022). Introduction: landscaping the human garden. In *Landscaping the Human Garden* (pp. 1-1). Stanford University Press.



Evaluation (Theory, USBOT4501OE1): Total marks per course – 50

Formative Assessment 'for' Learning

(continuous internal assessment - CIA to improve learning).

CIA - 20 marks

CIA 1: Written test - 10 marks.

CIA 2: Test / Assignment / Presentations / Infographics / Quiz / as prescribed - 10 marks.

Summative Assessment 'of' Learning

(focus on outcomes, quantitative data for outcomes of instruction)

End Semester Examination - 30 marks

One question from each unit for 15 marks, with internal choice.

Total marks per question with choice 10 - 15 marks.

Distribution of Bloom's Taxonomy levels for the course assessment

Learning Levels	Remember	Understand	Apply	Analyze	Evaluate	Create
*Percentage	10-25%	15-20%	20-30%	10-20%	10-20%	5-10%



FYBA, FYBMS, FYMCJ, FYBAF, FYBCom		
Course Title: Plants in Human Nutrition		
Course Code: USBOT4502OE1		
Credits 2: Theory (2) = 30 hrs		
No.	Course Objectives	
1.	Make the students familiar with the nutritional importance of diverse plants.	
2.	Clarify the plant sources for carbohydrates, fats, proteins, vitamins, minerals and fibres.	
3.	Connect the nutrients in plants with human health, prevention of chronic diseases, and supplements of specific nutrients	
4.	Generate interest in plants, its conservation, and sustainability.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1.	Perceive the significance of plants in maintaining good health, preventing common diseases, fulfilling nutritional deficiencies and in reducing the risk of chronic diseases.	Remembering
2.	Comprehend the components of a nutritional healthy diet.	Understanding
3.	Appreciate the value of plants in one's diet.	Applying
4.	Discern healthy eating with sustainability.	Analyzing
5.	Recognize our dependency on edible plants and its implications on ecology, economics and society.	Evaluating



- UNIT I Major plant groups in nutrition 15 L**
1. **Cereals, Legumes and cash crops:** Wheat and rice, economics and uses. A brief account of millets and their nutritional importance, (Jowar). General account, (Chickpea). Cash crops: sugarcane and its benefits (08)
 2. **Spices, fruits, beverages, oils and fats:** Importance of spices, (clove). Citrus fruits; beverages: tea and coffee; General description, uses and health implications of safflower oil, and Groundnut. (07)
- UNIT II Sustainable use of plants in nutrition 15 L**
1. **Functional foods:** Introduction, importance of *Moringa*, coconut oil as functional foods. Drug-yielding plants: therapeutic and habit-forming drugs with special reference to *Aloe vera* and *Cannabis*. Dietary fibers containing plants: oats, fruits, vegetables, and root tubers. (09)
 2. **Diet, biodiversity and implications:** Concept of a nutritionally healthy diet, sustainable diets, and biodiversity; ecological, economic, and social implications of man's dependency on edible plants in light of threats to plants and their native habitats. (06)



Reference Books:

1. Chrispeels, M.J. and Sadava, D.E. (1994). Plants, Genes and Agriculture. Jones & Bartlett Publishers.
2. Gopalan C, Rama Sastri B V, Balasubramanian S C, Narasinga Rao B S, Deosthale Y G, Pant K C, (2004). Nutritive value of Indian foods. National Institute of Nutrition, ICMR, Hyderabad, India, Revised edition.
3. Kochhar, S. L. (2012). Economic Botany in Tropics. New Delhi, India: MacMillan & Co
4. Mitra Debabrata, Guha Jibes, Chaudhuri Salil Kumar, (1990). Studies in Botany Vol-II, Moulik Library, Calcutta, 5th revised edition.
5. Pandey B P, Economic Botany, S. Chand & Company, New Delhi, 5th revised edition, 1995.
6. Wickens, G.E. (2001). Economic Botany: Principles & Practices. The Netherlands: Kluwer Academic Publishers.

Evaluation (Theory, USBOT4502OE1): Total marks per course – 50

Formative Assessment ‘for’ Learning

(continuous internal assessment - CIA to improve learning).

CIA - 20 marks

CIA 1: Written test - 10 marks.

CIA 2: Test / Assignment / Presentations / Infographics / Quiz / as prescribed - 10 marks.

Summative Assessment ‘of’ Learning

(focus on outcomes, quantitative data for outcomes of instruction)

End Semester Examination - 30 marks

One question from each unit for 15 marks, with internal choice.

Total marks per question with choice 10 - 15 marks.

Distribution of Bloom’s Taxonomy levels for the course assessment

Learning Levels	Remember	Understand	Apply	Analyze	Evaluate	Create
*Percentage	20-25%	20-25%	10-15%	10-15%	10-15%	03-05%





Syllabus
Second Semester Course in
BSc
Botany
(November 2023 onwards)

- Skill Enhancement Course:
 - USBOT4502SE1 Indian Forests and its Conservation
- Evaluation and Assessment guidelines



APPROVED SYLLABUS

Shinde

PRINCIPAL
ST. XAVIER'S COLLEGE
AUTONOMOUS
MUMBAI - 400 001.

FYBSc		
Course Title: Indian Forests and its Conservation		
Course Code: USBOT4502SE1		
Credits (2): Theory (1) = 15 hrs and Practical (1) = 30 hrs		
No.	Course Objectives	
1.	Understand the principles of forest ecology, including forest structure and function.	
2.	Identify common tree species and other flora in different types of forest in India.	
3.	Familiarize oneself with forest policy and regulations. Enumerate and evaluate different methods of forest conservation.	
4.	Understand the processes of collection, storage, and treatment of tree seeds, and to investigate the factors influencing seed dormancy, viability, and germination.	
5.	Develop proficiency in photographing various aspects of trees for scientific documentation and study.	
6.	Estimate tree biomass using non-destructive techniques and understand the principles behind these methods.	
7.	Gain hands-on experience by visiting a protected area or botanical garden, observing plant diversity, and studying conservation practices in situ.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1.	Understand the importance of traditional ecological knowledge in forest management. Describe the different forest types in India and their geographical distribution.	Remembering
2.	Appreciate the importance of forest and realize its conservation needs. Collect, store, and manage tree seeds while understanding the conditions necessary for breaking dormancy and initiating germination.	Understanding
3.	Identification of some local trees and know its importance. Apply non-destructive methods to estimate the biomass of trees and understand the underlying principles of these techniques.	Applying
4.	Analyze the National forest policies, and the Forest Conservation Act, 1980. Skillfully take and analyze photographs of trees, capturing details from various angles and perspectives for scientific records.	Analyzing



5.	Conduct forest inventory assessments using appropriate measurement techniques.	Evaluate
----	--	----------

UNIT I Forest Conservation Strategies

15 L

A. Forest status and forest management

1. Importance & status of forests in India, types of forests in India, threats to Forest Ecosystems. (03)
2. Sustainable Forest Management - Principles of sustainable forestry, reforestation and afforestation. (04)

B. Forest conservation an policies

1. Basics of Protected areas and reserves, biodiversity conservation in forests, community-based conservation, urban forestry and agroforestry. (04)
2. Introduction to National forest policies, The Forest (Conservation) Act, 1980, The Indian Forest Act, 1927. (04)

Reference Books:

1. Eisenlohr Pedro, (2019). Forest Conservation: Methods, Management and Challenges., Brasil.
2. MoEF, NewDelhi, Govt. Of India, (2015). Handbook of Forest (Conservation) Act, 1980, Forest Conservation Rules, 2003, Guidelines and Clarifications.
3. Newton Adrian, (2007). Forest Ecology and Conservation: A handbook of techniques, Oxford,.
4. Sahana Mehebut, Areendran Gopala, Raj Krishna. (2022). Conservation, Management and Monitoring of Forest Resources in India,. Springer Cham,.
5. Sunder Shyam S, Parameswarappa, S. (2014). Forest Conservation Concerns in India, Bishen Singh, Mahendra Pal Singh.
6. Tomback Diana F, Ed., (2019). Biodiversity and Conservation in Forests, Mdpi AG.



S. No. Name of Practical

1. Identification of some local trees.
2. Study of different forests of India using map.
3. Collection and storage of tree seeds, study of their dormancy and viability, and required conditions for germination.
4. Taking photographs of tree/s (entire, bark, trunks and branches, canopy, leaves, flowers, nests, birds and animal visitors, pests and infections)
5. To determine the height and girth of a tree.
6. Estimation of tree biomass with the help of non- destructive methods.
7. Enumeration of forest conservation methods.
8. Visit a protected area / botanical garden and study the diversity and conservation practices.

Evaluation (Theory and Practical, USBOT4502SE1): Total marks per course – 50

Formative Assessment 'for' Learning

(continuous internal assessment - CIA to improve learning- practical).

CIA - 20 marks (Theory and Practical portion)

CIA 1: Test (Theory) - 10 marks.

CIA 2: Assignment / as prescribed (Practical) - 10 marks.

Summative Assessment 'of' Learning

(focus on outcomes, quantitative data for outcomes of instruction)

End Semester Examination (Theory and Practical portion) - 30 marks

Distribution of Bloom's Taxonomy levels for the course assessment

Learning Levels	Remember	Understand	Apply	Analyze	Evaluate	Create
*Percentage	20-25%	15-20%	15-25%	15-20%	15-20%	5-10%

