Anekant Education of Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
(Autonomous)

UG Syllabus : w.e.f. 2022-23 to 2024-25

Preamble

The first year B.Sc. syllabus including fundamental as well as advanced concepts in the Botany. After studying the syllabus, students shall inspire for pursuing higher studies in Botany and becoming an entrepreneur. This syllabus can helpful to understand diversity in plant groups and plant science related industries. The practical course is aimed to equip the students with skills required for plant identification, description, classification and also applications of these plants in various industries.

Program Outcomes (Pos) for B. Sc. Program

PO1	**Disciplinary Knowledge:** Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate programme. Execute strong theoretical and practical understanding generated from the specific graduate programme in the area of work.
PO2	**Critical Thinking and Problem solving:** Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	**Social competence:** Display the understanding, behavioural skills needed for successful social adaptation , work in groups, exhibit thoughts and ideas effectively in writing and orally
PO4	**Research-related skills and Scientific temper :** Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	**Trans-disciplinary knowledge:** Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem
PO6	**Personal and professional competence:** Performing dependently and also collaboratively as a part of a team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	**Effective Citizenship and Ethics:** Demonstrate empathetic social concern and equity centred national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	**Environment and Sustainability:** Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO9	**Self-directed and Life-long learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

F. Y. B. Sc. Botany Syllabus (2022-23 to 2024-25)

Class	Sem.	Paper	Title of Paper	Credits
F.Y.B.Sc.	I	USBT111	Diversity of Cryptogams	02
		USBT112	Industrial Botany - I	02
		USBT113	Practical - I	02
	II	USBT121	Diversity of Phanerogams	02
		USBT122	Industrial Botany - II	02
		USBT123	Practical - II	02
S.Y.B.Sc.	III	USBT---	Taxonomy of Angiosperms	03
		USBT---	Plant Physiology	03
		USBT---	Practical - III	02
	IV	USBT---	Anatomy and Embryology	03
		USBT---	Plant Ecology	03
		USBT---	Practical - IV	02
T.Y.B.Sc.	V	USBT---	Cryptogamic Botany (Algae, Fungi, Bryophytes and Pteridophytes)	03
		USBT---	Spermatophyta and Palaeobotany	03
		USBT---	Cell and Molecular Biology	03
		USBT---	Industrial Botany	03
		USBT---	Biostatistics	03
		USBT---	Optional Paper : Botanical Techniques / Horticulture	03
		USBT---	Practical - V	02
		USBT---	Practical - VI	02
		USBT---	Practical - VII	02
	VI	USBT---	Plant Physiology and Biochemistry	03
		USBT---	Plant Biotechnology	03
		USBT---	Genetics and Plant Breeding	03
		USBT---	Plant Pathology	03
		USBT---	Pharmacognosy	03
		USBT---	Optional Paper : Research Methodology / Seed Technology	03
		USBT---	Practical - VIII	02
		USBT---	Practical - IX	02
		USBT---	Project	02

SYLLABUS (CBCS) FOR F. Y. B. Sc. BOTANY

(w.e. from June, 2022)

Academic Year 2022-2023

Class : **F. Y. B. Sc. (Semester - I)**
Paper Code: **USBT111**
Paper : **I** Title of Paper: **Diversity of Cryptogams**
Credit : 2 No. of lectures: 36

A) Learning Objectives:

1. To understand the plant diversity with special reference to cryptogams diversity.
2. To give idea of conservation and economic importance of cryptogams.

B) Course Outcome:

By the end of the course, students will be able to:

CO1. Identify, describe and study in detail life cycle of cryptogams.
CO2.Provide plant description, describe the morphology and reproductive structure of cryptogams.
CO3. Gain the proficiency in the identification of cryptogams.
CO4. Knowledge of comparison between cryptogams and other plant groups.
CO5. Knowledge of scope of the cryptogams diversity.
CO6. Knowledge about habitat conservation of cryptogams diversity.
CO7. Knowledge about the applications of cryptogams.

Credit - I (20 L)

Unit - 1

1.1 **Introduction** : General outline of plant kingdom, introduction to lower cryptogams and higher cryptogams and their scope and importance, awareness and need of conservation (4L).

1.2 **Algae** : Introduction, habitat, thallus diversity, pigments, reserve food and types of reproduction, Life cycle of *Spirogyra,* Economic importance of algae (08L).

Unit - 2

2.1 **Fungi** : General characters, thallus structure, mode of nutrition and types of reproduction, pathogenic importance of fungi, Life cycle of *Rhizopus,* Economic importance of fungi (08L).

Credit - II (16 L)

Unit - 3

3.1 **Lichens** : General characters, and Types of Lichens on the basis of thallus morphology. Economic importance of lichens (3L).

3.2 **Bryophytes** : Occurrence and Salient features, Life cycle of *Riccia*, Economic importance of Bryophytes (7L).

3.3 **Pteridophytes** : Occurrence and Salient features, Life cycle of *Equisetum*, Economic importance of Pteridophytes (6L).

References :

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2. Krishnamurthy V. (2000) : Algae of India and neighboring countries I. Chlorophycota, Oxford & IBH, New Delhi.
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20. Gangulee and Kar (2006) : College Botany. New Central Book Agency.
21. Sundar Rajan S. (1999) : Introduction to Pteridophyta. New Age International Publishers, New Delhi.

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Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: F.Y. B. Sc. (Sem. I) **Subject**: Botany

Course: Diversity of Cryptogams **Course Code**: USBT 111

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

	Programme Outcomes (POs)								
Course Outcomes	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9
CO 1	3		2						3
CO 2	3								
CO 3		3							
CO 4	3								
CO 5				3					
CO 6		2	3					3	
CO 7	2	1		2					

Justification for the mapping

PO1: Disciplinary Knowledge

CO1. Identify, describe and study in detail life cycle of Phanerogams.

CO2. Provide plant description, describe the morphology and reproductive structure of cryptogams.

CO4. Knowledge of comparison between cryptogams and other plant groups.

CO7. Knowledge about the applications of cryptogams.

PO2: Critical Thinking and Problem Solving

CO3. Gain the proficiency in the identification of cryptogams.

CO6. Knowledge about habitat conservation of cryptogams diversity.

CO7. Understand the local flora with respect to Phanerogams.

PO 3: Social competence

CO1. Identify, describe and study in detail life cycle of Phanerogams.

CO6. Knowledge about habitat conservation of cryptogams diversity.

PO 4: Research-related skills and Scientific temper

CO5. Knowledge of scope of the cryptogams diversity.

CO7. Knowledge about the applications of cryptogams

PO 8: Environment and Sustainability

CO6. Knowledge about habitat conservation of cryptogams diversity.

PO 9: Self-directed and Life-long Learning

CO1. Identify, describe and study in detail life cycle of cryptogams.

Class : **F. Y. B. Sc. (Semester - I)**
Paper Code : **USBT112**
Paper : **II** Title of Paper : **Industrial Botany - I**
Credit : 2 No. of lectures : 36

A) Learning Objectives:

1. To enlist the industrial applications of Botany
2. To provide technical knowledge of floriculture and nursery industries.

B) Learning Outcome:

By the end of the course, students will be able to:

CO1. Understand basics of plant resource based industries.
CO2. Knowledge about natural and artificial propagation methods.
CO3. Knowledge about different types of nurseries and its commercial applications.
CO4. Develop floriculture industries on their own.
CO5. Develop plant tissue culture industry.
CO6. Get expertise to develop agro based industries.
CO7. Get expertise in field of Industrial Botany.

Credit - I

Unit - 1 (20L)

2.1 **Introduction to Industrial Botany:** Concept of Industrial Botany. Plant resources and industries: Food, fodder, fibers, medicines, timber, dyes, gum, tannins. (Two examples of each resource and the relevant industries). **(2L)**

2.2 **Floriculture Industry:** Introduction, Scope, Important floricultural crops, Open cultivation practices- harvesting and marketing of Tuberose. Concept of green house, Indoor cultivation practices-harvesting and marketing of *Gerbera,* **(6L)**

2.3 **Plant Nursery Industry:** Concept and types of nurseries: ornamentals, fruit plants, medicinal plants, vegetables, orchids, forest nursery, commercial applications. **(6L)**

2.4 **Propagation methods**: Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting: Stem, Layering: Air layering, Grafting: Stone grafting and Approach grafting, Budding: T-budding). **(6L)**

Credit - II

Unit - 2 (16L)

2.1 **Plant Tissue Culture Industry:** Concept, culture techniques: Types of explants, preparation of media, methods of sterilization, inoculation techniques, incubation and hardening. Commercial significance (**6L)**

2.2 **Agri Industries:** Organic Farming: Concept and need, types of organic fertilizers, advantages and limitations. Seed industries: Importance of seed industries, seed production, seed processing and seed marketing

with reference to cotton. Major seed industries and corporations of India **(6L)**

2.3 **Post Harvest Technology**: Methods of preservation, preparation of value added products fruit pulp, fruit powder, chips, jam, juice, ketchup. Packaging and marketing (4L)

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12. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farming (Ann Larkin Hansen) (2010) : Storey Publications.
13. Hand Book of Mushroom Cultivation, Processing and Packaging (2007) : Engineers India Research In Publishers
14. Paul Stamets (2011) : Growing Gourmet and Medicinal Mushrooms, Ten Speed Press Publishers
15. Amarjit S. Basra (2006) : Handbook of Seed Science And Technology: Seed biology, Production, and Technology, Food Products Press publishers.

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Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: F.Y. B. Sc. (Sem. I) **Subject**: Botany

Course: Industrial Botany - I **Course Code**: UBT 112

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

	Programme Outcomes (POs)								
Course Outcomes	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9
CO 1	3						3		
CO 2	3								
CO 3	3								
CO 4				3					
CO 5				3					
CO 6				3	3	2		2	
CO 7				3		1			

Justification for the mapping

PO1: Disciplinary Knowledge

CO1. Understand basics of plant resource based industries.
CO2. Knowledge about natural and artificial propagation methods.
CO3. Knowledge about different types of nurseries and its commercial applications.

PO 4: Research-related skills and Scientific temper

CO4. Develop floriculture industries on their own.
CO5. Develop plant tissue culture industry.
CO6. Get expertise to develop agro based industries.
CO7. Get expertise in field of Industrial Botany.

PO5: Trans-disciplinary Knowledge

CO6. Get expertise to develop agro based industries.

PO6: Personal and Professional Competence

CO6. Get expertise to develop agro based industries.
CO7. Get expertise in field of Industrial Botany.

PO 7: Effective Citizenship and Ethics

CO1. Understand basics of plant resource based industries.

PO 8: Environment and Sustainability

CO6. Get expertise to develop agro based industries.

Class : **F. Y. B. Sc. (Semester - I)**
Paper Code : **USBT113**
Paper : **III** Title of Paper : **Practical-I**
Credit : **2** No. of Practicals : **11**

A) Learning Objectives :

1. To give knowledge of handling of microscope and identification of cryptogams.
2. To give hands-on training of production of agro products.

B) Course Outcome:

By the end of the course, students will be able to:

C01. Expertise in handling of microscope.
CO2. Knowledge of morphological and anatomical variations in cryptogams.
CO3. Identify the cryptogams.
CO4. Develop entrepreneurship in agro products.
CO5. Expertise in artificial plant propagation.
CO6. Get knowledge of career opportunities in plant based industries.
CO7. Expertise in the field of Industrial Botany.

1. Study of *Spirogyra* 1P
2. Study of *Rhizopus* 1P
3. Study of Lichen diversity 1P
4. Study of *Riccia* 1P
5. Study of *Equisetum* 1P
6. Study of plant resources in industries: food, fodder, fiber, medicine, timber and gum (one example of each). 1P
7. Study of artificial plant propagation: Stem cutting and Air Layering. 1P
8. Study of artificial plant propagation: Approach grafting and T- budding. 1P
9. Demonstration of micropropogation methods. 1P
10. Preparation of Jam and Squash1P
11. One day botanical excursion to study cryptogam's diversity / Visit of Agrobased Industry (Study / visit report is compulsory).1P

(Note: Visit mentioned in the practical No. 11 is compulsory. It carries 10 marks at the time of practical examination).

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: F.Y. B. Sc. (Sem. I) **Subject**: Botany

Course: Botany Practical - I **Course Code**: USBT 113

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

	Programme Outcomes (POs)								
Course Outcomes	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9
CO 1									
CO 2	3	2							
CO 3	3	3							3
CO 4			3					2	
CO 5									
CO 6									
CO 7				2					

Justification for the mapping

PO1: Disciplinary Knowledge

CO2. Knowledge of morphological and anatomical variations in cryptogams.
CO3. Identify the cryptogams.

PO2: Critical Thinking and Problem Solving

CO2. Knowledge of morphological and anatomical variations in cryptogams.
CO3. Identify the cryptogams.

PO 3: Social competence
CO4. Develop entrepreneurship in agro products.

PO 4: Research-related skills and Scientific temper
CO7. Expertise in the field of Industrial Botany.

PO 8: Environment and Sustainability

CO4. Develop entrepreneurship in agro products.

PO 9: Self-directed and Life-long Learning

CO3. Identify the cryptogams.