Academic Council Date – 13/06/2024
Item No. – 02

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

Arts, Commerce and Science College, New Panvel (Autonomous)

Re-accredited A+ Grade by NAAC (Third Cycle-CGPA-3.61)
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

As per National Education Policy - 2020

B. Sc. in Botany

(Faculty of Science)

Syllabus for F.Y. B. Sc. (Botany)

Semester I and II

(With effect from the academic year 2024-25)

As per National Education Policy - 2020

Sr. No.	Heading	Particulars
1	**Title of program**	B. Sc.
2	**Eligibility**	H.S.C. Pass
3	**Duration of program**	1 Year
4	**Intake Capacity**	80
5	**Scheme of Examination**	Internal: Practical 40Marks External: Theory 60 Marks
6	**Standards of Passing**	40%
7	**Semesters**	I and II
8	**Program Academic Level**	UG
9	**Pattern**	Revised as per NEP 2020
10	**Status**	New (Approved in BOS and Academic Council)
11	**To be implemented from Academic Year**	Academic Year 2024-25

Signature of

Dr. Tanmay P. Patil
Head, Department of Botany
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Signature of

Prof. (Dr.) S.K. Patil
Principal
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Preamble

1. Introduction

The First Year Bachelor of Science in Botany curriculum is designed to immerse students in a comprehensive exploration of plant sciences, blending foundational knowledge with contemporary advancements.

Emphasizing both traditional botanical disciplines and modern interdisciplinary perspectives, the syllabus integrates core subjects like plant anatomy, morphology, and life cycles with cutting-edge fields such as phytochemistry, molecular biology, and environmental studies.

Students will delve into the ecological significance and economic importance of diverse plant groups—from microscopic algae and fungi to complex angiosperms and gymnosperms—while also exploring practical applications in industries ranging from agriculture to biotechnology.

This curriculum aims to foster a deep understanding of plant biology, inspire curiosity about the natural world, and prepare students for diverse career pathways in plant sciences and beyond.

2. Aims and Objectives

The aim of the Botany curriculum is to provide students with a comprehensive understanding of plant diversity, structure, and function, encompassing microscopic organisms like algae and fungi, primitive plants such as bryophytes, and more advanced groups like pteridophytes, gymnosperms, and angiosperms. Through detailed study of their morphology, life cycles, ecological roles, and economic significance, students will develop a profound appreciation for the complexities and importance of plants in natural ecosystems and human societies alike.

- To introduce the learners to various plant groups from simple to the most advanced.
- To create awareness among the learners about the urgency of environmental conservation and sustainable use of plants
- To make the students aware of applications of different plant systems, processes and products in various industries
- To highlight the entrepreneurial potential of plant sciences to become self-employed in the future.

- To equip the learners with skills of analytical and logical reasoning, keen observation, collection of scientific data, objective recording of results, drawing conclusions etc. and other such fundamental skills associated with the study of any science subject.
- To create a sound foundation for further studies in Botany.
- To facilitate career building in Botany.

3. Learning Outcomes

Upon successful completion of this course, learners will be able to:

1. Explain the distinguishing features, ecological roles, and economic importance of algae and fungi.
2. Analyze the structure, life cycle, and systematic positions of *Nostoc, Spirogyra, Rhizopus, Aspergillus,* and *Riccia*.
3. Describe the general structure and functions of eukaryotic plant cell organelles, including the nucleus, endoplasmic reticulum, chloroplasts, and mitochondria.
4. Discuss the molecular structures and functions of DNA and RNA in plant cells.
5. Compare and contrast the processes of mitosis and meiosis, emphasizing their biological significance.
6. Explain the distinguishing features, ecological roles, and economic importance of Pteridophyta and Gymnosperms with suitable examples.
7. Analyze the structure, life cycle, and alternation of generations of *Nephrolepis* and *Cycas.*
8. Describe the distinguishing features, ecological significance, and economic importance of Angiosperms with suitable examples.
9. Identify and describe leaf morphology in prescribed Angiosperm families, including incisions of leaf, venation, phyllotaxy, types of stipules, leaf apex, leaf margin, leaf base, and leaf shapes.
10. Classify and describe inflorescence types in Angiosperms, including racemose (simple raceme, spike, catkin, spadix, panicle) and cymose (monochasial, dichasial, polychasial) types, as well as compound types (corymb, umbel, cyathium, capitulum, verticillaster, hypanthodium).

4. Credit Structure of the F.Y.B. Sc. (Botany) Semester I and II

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
A	**Discipline Specific Course (Major)**		A	**Discipline Specific Course (Major)**	
1	Botany I (Plant Diversity and Cell biology)	3	1	Botany II (Plant Diversity and Anatomy)	3
2	Botany I (Plant Diversity and Cell biology) Practical	1	2	Botany II (Plant Diversity and Anatomy) Practical	1
Total Credits		**04**	**Total Credits**		**04**

Abbreviations Used

- POs: Program Outcomes
- PS: Program Structure
- PSOs: Program Specific Outcomes
- COs: Course Outcomes
- TLP: Teaching-Learning Process
- AM: Assessment Method
- DSC: Discipline Specific Core
- DSE: Discipline Specific Elective
- GE: Generic Elective
- OE: Open Elective
- VSC: Vocational Skill Course
- SEC: Skill Enhancement Course
- IKS: Indian Knowledge System
- AEC: Ability Enhancement Course
- VEC: Value Education Course
- OJT: On Job Training (Internship)
- FP: Field project
- CEP: Community engagement and service
- CC: Co-curricular Courses
- RM: Research Methodology
- RP: Research Project
- MJ: Major Course
- MN: Minor Course

Program Outcomes (POs)

PO No.	POs Statement After completing the Bachelor of Science Program, students will be able to-	Knowledge and Skill
PO-1	The knowledge of the disciplines and in-depth and extensive knowledge, understanding and skills in a specific field of interest.	Disciplinary knowledge
PO-2	An ability to develop and conduct experiments, analyze, and interpret data and use scientific judgment to draw conclusions	Scientific reasoning
PO-3	An ability to use current technology, and modern tools necessary for creation, analysis, dissemination of information.	Digital literacy
PO-4	Innovative, professional, and entrepreneurial skills needed in various disciplines of science.	Life-long learning
PO-5	An ability to achieve high order communication skills.	Communication skills
PO-6	An ability to collect, analyze and evaluate information and ideas and apply them in problem solving using conventional as well as modern approaches	Problem solving
PO-7	A sense of social responsibility; intellectual and practical skills and demonstration of ability to apply it in real-world settings.	Reflective thinking
PO-8	An ability to engage in independent and life-long learning through openness, curiosity, and a desire to meet new challenges.	Life-long learning
PO-9	A capacity to relate, collaborate, and lead others, and to exchange views and ideas to work in a team to achieve desired outcomes	Teamwork
PO-10	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Leadership
PO-11	An ability to understanding values, ethics, and morality in a multidisciplinary context.	Moral and ethical awareness

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

Arts, Commerce and Science College, New Panvel (Autonomous)

Syllabus for F.Y.B. Sc. (Botany) Semester I
Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Structure

Course Code	SEM-I	Credits
USC2BO1	**Botany I (Plant Diversity and Cell biology)**	**3 Credits (45 Lectures)**
Unit-I	**Algae and Fungi**	**15**
1.	Distinguishing features, Ecological significance and Economic importance of Algae and Fungi with suitable example	
2.	Structure, life cycle and Systematic position of *Nostoc* and *Spirogyra*	
3.	Structure, life cycle and Systematic position of *Rhizopus* and *Aspergillus*	
Unit-II	**Bryophyta**	**15**
1.	Distinguishing features, Ecological significance and Economic importance of Bryophytes with suitable example.	
2.	Structure, life cycle and Systematic position of *Riccia*	
Unit-III	**Cell biology**	**15**
1.	General Structure of Eukaryotic Plant Cell, Ultrastructure and function of Nucleus, Endoplasmic reticulum, Chloroplast and Mitochondria	
2.	Structure of DNA and RNA	
3.	Cell Division: Mitosis & Meiosis, Differences between Mitosis and Meiosis	

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Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Code: USC1BO1

Course Title: Botany I (Plant Diversity and Cell biology)

Course Type: Major

No. of Credits: 3

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Differentiate between the different plant groups namely Algae and Bryophyta, as well as Fungi.
CO-2	Understand Ecological significance and Economic importance of Algae, Fungi, Bryophytes
CO-3	Identify various plant cell organelles, structure of DNA & RNA
CO-4	Understand the Cell division -Mitosis and Meiosis

Syllabus for F.Y.B. Sc. Semester I

Choice Based Credit System

Under New Education Policy (NEP) 2020

Course Code: USC1BO1P

Course Title: Botany I (Plant Diversity and Cell biology)

Course Type: Major **No. of Credits: 1**

Course Code	SEM-I Title	Credits
USC2BO1P	**Practicals Botany I (Plant Diversity and Cell biology)**	**1 Credit**
1	Study of stages in the life cycle of *Nostoc* from fresh/ preserved material and permanent slides.	
2	Study of stages in the life cycle of *Spirogyra* from fresh/ preserved material and permanent slides.	
3	Economic importance of Algae: Phytoremediation and Food: *Nostoc, Spirulina*, Biofuel: *Ulva*, Algin: *Laminaria*, Agar: *Gelidium*, Diatomite: Diatoms	
4	Study of stages in the life cycle of *Rhizopus* from fresh/ preserved material and permanent slides.	
5	Study of stages in the life cycle of *Aspergillus from* fresh/ preserved material and permanent slides.	
6	Economic importance of Fungi: Food: *Agaricus, Pleurotus, Yeast*, Plant Pathogens: Any Plant pathogenic fungus, Recycling of nutrients: Any saprophytic fungus.	
7	Study of stages in the life cycle of *Riccia* from fresh/ preserved material	
8	Ecological Significance of Algae, Fungi and Bryophytes: Lichens, Mycorrhizae, Symbiotic association of *Nostoc and Anthoceros.*	
9	Identification of cell organelles in a plant cell with the help of photomicrograph (Chloroplast, Mitochondria, Endoplasmic reticulum, Nucleus)	
10	Study of Mitosis with the help of *Onion* root tip	
11	Study of Meiosis with the help of *Tradescantia/ Onion* flower buds	

Syllabus for F.Y.B. Sc. Semester I

Choice Based Credit System

Under New Education Policy (NEP) 2020

Course Code: **USC1BO1P**

Course Title: **Botany I (Plant Diversity and Cell biology)**

Course Type: Major **No. of Credits: 1**

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Identify *Nostoc, Spirogyra,Rhizopus, Aspergillus, Riccia, Anthoceros* and different cell organelles
CO-2	Explain ecological significance and economic importance of algae, fungi and bryophytes
CO-3	Differentiate between algae, fungi and bryophytes, cell organelles.
CO-4	Prepare the slides to show different stages of cell division.

Syllabus for F.Y.B. Sc. Semester I

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

References:

Semester I

Unit I: Algae and Fungi

1. College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises
2. Cryptogamic Botany Volume I and II by G M Smith McGraw Hill.
3. Botany for Degree Students, Algae by B.R.Vasishtha S. Chand Publications
4. Botany for Degree Students, Fungi by B.R. Vasishtha S. Chand Publications
5. Introductory Mycology, Alexopoulos, Mims, Wiley Eastern Publication, latest edition

Unit II: Bryophyta

1. Botany for Degree Students, Bryophyta by B.R.Vasishtha S. Chand Publications

Unit III: Cell biology

1. Cell Biology by De Robertis, Wolters, Kluver
2. Cell Biology by Channarayappa, Universities Press
3. Plant Anatomy by B. P. Pandey, S. Chand Publications
4. Plant Anatomy and Embryology by S.N. Pandey and Chadha, Vikas Publications, latest Edition.

Syllabus for F.Y.B. Sc. (Botany) Semester II

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Structure

Course Code	SEM-II Title	Credits
USC2BO2	**Botany II (Plant Diversity and Anatomy)**	**3 Credits (45 Lectures)**
Unit-I	**Pteridophyta and Gymnosperm**	**15**
1.	Distinguishing features, Ecological significance and Economic importance of Pteridophyta and Gymnosperms with suitable examples.	
2.	Structure, life cycle and Alternation of Generations of *Nephrolepis*	
3.	Structure, life cycle and Alternation of Generations of *Cycas*	
Unit-II	**Angiosperm**	**15**
1.	Distinguishing features, Ecological significance and Economic importance of Angiosperms with suitable examples.	
2.	Leaf Morphology of the prescribed Angiosperm families with respect to: Incisions of leaf, venation, phyllotaxy, types of stipules, leaf apex, leaf margin, leaf base, leaf shapes.	
3.	Inflorescence: Racemose: simple raceme, spike, catkin, spadix, and panicle. Cymose: monochasial, dichasial, polychasial. Compound: corymb, umbel, cyathium, capitulum, verticillaster, hypanthodium	
Unit-III	**Anatomy**	**15**
1.	Simple Tissues: Parenchyma, Collenchyma and Sclerenchyma.	
2.	Complex Tissues: Xylem and Phloem.	
3.	Types of vascular bundles	
4.	Primary Structure of Dicot and Monocot Root, Stem and Leaf	

Syllabus for F.Y.B. Sc. Semester II

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Code: USC1BO2

Course Title: Botany II (Plant Diversity and Anatomy)

Course Type: Major

No. of Credits: 3

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Explain Ecological significance and Economic importance of Pteridophyta, Gymnosperms and Angiosperm
CO-2	Differentiate between the different plant groups namely Pteridophyta, Gymnosperms and Angiosperm
CO-3	Understand the leaf morphology.
CO-4	Identify simple and complex tissue as well as primary structure of dicot. monocot root, stem and leaf

Syllabus for F.Y.B. Sc. Semester II

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Code	SEM-II Title	Credits
USC2BO2P	**Practicals Botany II (Plant Diversity and Anatomy)**	**1 Credit**
1	Study of stages in the life cycle of *Nephrolepis:* Mounting of ramentum, hydathode, T.S. of rachis.	
2	T.S. of pinna of *Nephrolepis* passing through sorus.	
3	*Cycas:* T.S of leaflet (*Cycas* pinna)	
4	Megasporophyll, microsporophyll, coralloid root, microspore, L.S. of ovule of *Cycas* – all specimens to be shown.	
5	Economic importance of Gymnosperms: *Pinus (*turpentine, wood, seeds)	
6	Leaf morphology: as per theory	
7	Types of inflorescences: as per theory	
8	Study of Simple tissue: Parenchyma, Collenchyma and Sclerenchyma	
9	Study of Complex tissue: Xylem and Phloem	
10	Study of Primary structure T.S of monocot root (*Maize*) and dicot root (Sunflower)	
11	Study of Primary structure T.S of monocot stem (*Maize*) and dicot stem (Sunflower)	
12	Study of Primary structure of monocot leaf (Maize) and dicot leaf (Sunflower)	

Syllabus for F.Y.B. Sc. Semester II

Choice Based Credit System

Under New Education Policy (NEP) 2020

Course Code: USC1BO2P

Course Title: Botany II (Plant Diversity and Anatomy)

Course Type: Major **No. of Credits: 1**

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Identify *Nephrolepis Cycas* and leaf morphology.
CO-2	Prepare slides to show the internal structure of *Nephrolepis* and *Cycas*
CO-3	Explain the economic importance of Gymnosperms
CO-4	Differentiate between simple and complex tissues and the primary structures of monocot and dicot roots stems, and leaves

References:

Semester II

Unit I: Plant Diversity

6. College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises
7. Botany for Degree Students,Pteridophyta By B..R.Vasishtha S.Chand Publication.
8. Botany for Degree Students,Gymnosperms By P.C..Vasishtha S.Chand Publication.

Unit II: Angiosperm

5. Taxonomy of Angiosperms by B.P. Pandey S. Chand Publications
6. Taxonomy of Angiosperms, AVSS Sambamurthy,
7. Text Book of Botany, Angiosperms, B.P. Pandey, S. Chand Publications

Unit III: Anatomy

1. Plant Anatomy by B. P. Pandey, S. Chand Publications
2. Plant Anatomy and Embryology by S.N. Pandey and Chadha, Vikas Publications, latest Edition.
3. Introduction to Plant anatomy, Eames A J, Mc Graw Hill publications, latest Edition.
8. Physiological Plant Anatomy, Haberlandt G
9. Plant Anatomy, Katherine Esau

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As per National Education Policy - 2020

Open Elective

Syllabus for F.Y. B. A. (Plants in Health care and Cosmetics)

Semester II

(With effect from the academic year 2024-25)

As per National Education Policy - 2020

Sr. No.	Heading	Particulars
1	**Title of program**	B. A
2	**Eligibility**	H.S.C. Pass
3	**Duration of program**	One semester
4	**Intake Capacity**	80
5	**Scheme of Examination**	Internal: Practical 40Marks External: Theory 60 Marks
6	**Standards of Passing**	40%
7	**Semesters**	II
8	**Program Academic Level**	UG
9	**Pattern**	Revised as per NEP 2020
10	**Status**	New
11	**To be implemented from Academic Year**	Academic Year 2024-25

Signature of

Name
Head, Department of _____
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Signature of

Prof. (Dr.) S.K. Patil
Principal
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Preamble

1) Introduction

The course **"Plants in Health Care and Cosmetics"** introduces students to the fascinating and transformative role of plants in promoting human health and enhancing beauty. It delves into the rich history and evolving significance of medicinal plants and their phytoconstituents, which have been utilized for centuries for their therapeutic and cosmetic benefits. Through the study of key phytochemicals such as **alkaloids, tannins, glycosides, essential oils, gums, and resins**, students will understand their classification, properties, extraction methods, and diverse applications in health and wellness.

A unique feature of the course is the exploration of traditional remedies found in **"Grandma's pouch"**—time-tested plants like **Tulsi, Neem, Aloe, Adulsa, Turmeric, and Ginger**. These plants will be studied in-depth, focusing on their botanical sources, active phytoconstituents, and their versatile use in both medicinal and cosmetic contexts. This segment connects students to the traditional wisdom of plant-based healing while also emphasizing its modern relevance.

The course also sheds light on **Herbal Cosmetics**, tracing their origin, history, and development alongside an understanding of the structure and care of human skin. Students will learn about common plants such as **Chandan (Sandalwood), Manjistha, Turmeric, Saffron, Aloe, Reetha, Shikakai, Hibiscus, Brahmi, and Bhringraj**, which are widely used in cosmetic preparations for the face, body, and hair.

This course offers students a comprehensive understanding of how plant-based products are integral to healthcare, disease prevention, and the growing cosmetic industry. It equips students with valuable knowledge to explore career opportunities in this emerging sector while fostering an appreciation for the role of plants in enhancing human health and beauty.

2) Aims and Objectives

Aim:

The aim of the course "Plants in Health Care and Cosmetics" is to provide students with a comprehensive understanding of the role of medicinal plants and their phytoconstituents in healthcare and cosmetics. It seeks to educate students on the classification, properties, and uses of key plant-derived compounds, while also exploring traditional remedies and the applications of herbal cosmetics. The course equips students with the knowledge and skills necessary to apply this understanding in health and beauty-related industries.

Objectives:

3) To study the classification, properties, extraction methods, and applications of phytoconstituents such as alkaloids, tannins, glycosides, essential oils, gums, and resins.
4) To explore the botanical sources, phytoconstituents, and medicinal and cosmetic uses of plants like Tulsi, Neem, Aloe, Adulsa, Turmeric, and Ginger.
5) To understand the origin, history, and development of herbal cosmetics and the role of plants in skincare and haircare.
6) To identify and study plants commonly used in the preparation of cosmetics, including Chandan, Manjistha, Turmeric, Saffron, Aloe, Reetha, Shikakai, Hibiscus, Brahmi, and Bhringraj.
7) To develop knowledge and skills for practical applications of plant-based products in healthcare and cosmetic industries.

Learning Outcomes

By the end of the course "Plants in Health Care and Cosmetics," students will be able to:

1. **Classify and describe** the properties, extraction methods, and applications of key phytoconstituents such as alkaloids, tannins, glycosides, essential oils, gums, and resins in healthcare and cosmetics.
2. **Identify and explain** the botanical sources, active phytoconstituents, and medicinal and cosmetic uses of traditional plants like Tulsi, Neem, Aloe, Adulsa, Turmeric, and Ginger.

3. **Understand** the origin, history, and development of herbal cosmetics, along with the structure and care of human skin.
4. **Recognize and analyze** the role of common plants such as Chandan, Manjistha, Turmeric, Saffron, Aloe, Reetha, Shikakai, Hibiscus, Brahmi, and Bhringraj in the preparation of cosmetics for face, body, and hair.
5. **Demonstrate the ability to apply knowledge** of plant-based products to healthcare and cosmetic industries, reflecting on their therapeutic, preventive, and beauty-enhancing potential.

Credit Structure of the F.Y.B. A. (Plants in Health care and Cosmetics)

Semester II

No. of Courses	Semester II	Credits
B	**Open Elective**	
1	Plants in Health care and Cosmetics	2
Total Credits		**02**

Abbreviations Used

- POs : Program Outcomes
- PS : Program Structure
- PSOs : Program Specific Outcomes
- COs : Course Outcomes
- TLP : Teaching-Learning Process
- AM : Assessment Method
- DSC : Discipline Specific Core
- DSE : Discipline Specific Elective
- GE : Generic Elective
- OE : Open Elective
- VSC : Vocational Skill Course
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- VEC : Value Education Course
- OJT : On Job Training (Internship)
- FP : Field project
- CEP : Community engagement and service
- CC : Co-curricular Courses
- RM : Research Methodology
- RP : Research Project
- MJ : Major Course
- MN : Minor Course

Syllabus for F.Y.B. A. Semester II

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Structure

Semester-II		L	CR
UA2PHCC1	**Plants in Health care and Cosmetics**	**30**	**2**
Unit I	**Medicinal Botany**	**15**	
1.	Phytoconstituents: Classification, properties, general methods of extraction, plant sources and uses of: alkaloids, tannins, glycosides, essential oils, gums and resins.		
2.	Grandma's pouch: Study of Tulsi, Neem, Aloe, Adulsa, Turmeric and Ginger with reference to botanical source, phyto-constituents, cosmetic and medicinal uses.		
Unit II	**Herbal Cosmetics**	**15**	
1.	Origin, History and Development of Herbal Cosmetics, structure of human skin		
2.	Common plants used in preparation of cosmetics for face, body and hair. (Chandan, Manjistha, Turmeric, Saffron, Aloe, Reetha, Shikakai, Hibiscus, Brahmi, Bhringraj)		

Syllabus for F.Y.B. A. Semester II

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

Course Code : UA2PHCC

Course Title : Plants in Health care and Cosmetics

Course Type: Open Elective **No. of Credits: 2**

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Program, students will be able to-
CO-1	Classify and describe the properties, extraction methods, and applications of major phytoconstituents like alkaloids, tannins, glycosides, essential oils, gums, and resins.
CO-2	Identify and explain the botanical sources, key phytoconstituents, and medicinal and cosmetic uses of plants such as Tulsi, Neem, Aloe, Adulsa, Turmeric, and Ginger from Grandma's pouch.
CO-3	Understand the origin, history, and significance of herbal cosmetics, and identify plants commonly used for skincare, haircare, and body care applications.
CO-4	Differentiate between types of phytochemicals and herbal cosmetic plants, analyzing their roles and benefits in health and beauty applications.

Syllabus for F.Y.B. Sc. Semester I
Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2024-2025)

References:

1. Plant Physiology, by Lincoln Taiz and Eduardo Zeiger, Sinauer Associates
2. Experimental Biochemistry by Beedu Shashidhar Rao and Vijay Deshpande, IK International Pvt. Ltd.
3. Biochemistry by U. Satyanarayan, Books and Allied P. Ltd.
4. Pharmacognosy by Kokate, Purohit and Gokhale, Nirali Prakashan
5. Practical Pharmacognosy by Khandelwal, Nirali Prakashan
6. Shah and Qadry's Pharmacognosy by J. S. Qadry, B. S. Shah Prakashan
7. Handbook of Ayurvedic Medicinal Plants by L. D. Kapoor, Herbal Reference Library
8. Encyclopedia of Medicinal Plants-1 and 2 by Roger Pamplo, Education and Health Library
9. Indian Medicinal Plants by Khar C.P., Springer Publication.
10. Medicinal Natural products-A Biosynthetic approach, John Wiley Sons.
11. Ayurveda Ahar/Diet by P.H.Kulkarni, Shri Satguru Prakashan
12. Ayurveda Unravelled by Dahanukar and Thatte National Book Trust India
13. Guide to Essential Oils and Aromatherapy by James David Rockefeller

Academic Council Date – 28/04/2025
Item No. –

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

Arts, Commerce and Science College, New Panvel (Autonomous)

Re-accredited A++ Grade by NAAC (Fourth Cycle-CGPA-3.52)
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

As per National Education Policy - 2020

Title of the Programme

B. Sc. in Botany

(Faculty of Science)

Syllabus for S.Y. B. Sc. (Botany)

Semester III and IV

(With effect from the academic year 2025-26)

As per National Education Policy - 2020

Sr. No.	Heading	Particulars
1	**Title of program**	B. Sc.
2	**Eligibility**	Students must have earned mandatory credits of Botany.
3	**Duration of program**	1 Year
4	**Intake Capacity**	30
5	**Scheme of Examination**	Internal: Practical 40Marks External: Theory 60 Marks
6	**Standards of Passing**	40%
7	**Semesters**	III & IV
8	**Program Academic Level**	UG
9	**Pattern**	Revised as per NEP 2020
10	**Status**	New (Approved in BOS and Academic Council)
11	**To be implemented from Academic Year**	Academic Year 2025-26

Signature of

Name
Head, Department of Botany
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Signature of

Prof. (Dr.) S.K. Patil
Principal
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Preamble

1) Introduction

This course offers an integrated study of Economic and Medicinal Botany along with Current Trends in Plant Science, highlighting the vital role of plants in health, agriculture, and sustainable development. It explores the origin and conservation of cultivated plants, emphasizing the significance of plant genetic resources and biodiversity. Students will study major crops, spices, and oil-yielding plants in terms of their morphology and economic value.

The medicinal botany section introduces key phytoconstituents and focuses on selected medicinal plants like *Ashwagandha*, *Ginger*, and *Neem*, covering their source, structure, constituents, and therapeutic uses.

The course also addresses modern agricultural innovations in Controlled Environment Agriculture (CEA) and soil-less farming methods such as hydroponics, aeroponics, and aquaponics, highlighting their role in sustainable food production. Overall, it prepares students for careers in plant sciences through a blend of traditional knowledge and modern advancements.

2) Aims and Objectives

Aims

- To provide students with a comprehensive understanding of the economic and medicinal importance of plants.
- To develop awareness about the conservation and sustainable utilization of plant genetic resources.
- To introduce key concepts and plant-based products used in agriculture, industry, and healthcare.
- To familiarize students with traditional knowledge and modern scientific approaches in plant science.
- To expose students to recent innovations and trends in agriculture and sustainable plant production.

Objectives

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

- Explain the origin and domestication of cultivated plants with reference to Vavilov's and Harlan's theories.
- Understand the role and significance of plant genetic resources and biodiversity in economic botany.
- Identify and describe major crop plants, their morphology, evolution, and economic uses.
- Gain knowledge of commercial and industrial plant products such as cereals, legumes, oil-yielding plants, sugar and starch sources, spices, and condiments.
- Classify phytoconstituents and describe their properties, extraction techniques, sources, and therapeutic applications.
- Study detailed monographs of selected medicinal plants including their biological sources, microscopic features, chemical constituents, and uses.
- Explain the principles and applications of Controlled Environment Agriculture (CEA), including vertical farming, greenhouse systems, and precision agriculture.
- Describe and compare the techniques and applications of soil-less farming systems such as hydroponics, aeroponics, and aquaponics.
- Evaluate the potential of plant-based solutions in addressing global challenges in health, agriculture, and sustainability.

3) Learning Outcomes

After successful completion of this course, students will be able to:

- Describe the origin and evolution of cultivated plants based on the concepts of Vavilov and Harlan, and identify primary and secondary centres of crop diversity.
- Explain the importance of plant genetic resources and outline methods for their conservation and sustainable use.
- Identify and classify major crop plants such as cereals, legumes, oil-yielding plants, and spices based on their morphology, uses, and economic significance.
- Evaluate the nutritive, economic, and ecological importance of commercial crops, including sugar-yielding, starch-yielding, and industrially valuable plant products.
- Understand the types, properties, and extraction methods of major phytoconstituents, including alkaloids, tannins, glycosides, essential oils, gums, and resins.

- Interpret the botanical, anatomical, and chemical characteristics of medicinal plants through detailed drug monographs of species like *Ashwagandha*, *Ginger*, *Neem*, and others.
- Recognize the role of medicinal plants in traditional and modern healthcare systems and their relevance in pharmacognosy and phytotherapy.
- Explain the principles and components of Controlled Environment Agriculture (CEA) and assess its role in enhancing crop production under limited natural resources.
- Compare soil-less farming techniques such as hydroponics, aeroponics, and aquaponics, and discuss their applications in sustainable agriculture.
- Apply botanical knowledge in real-world contexts, including agriculture, medicine, industry, and environmental conservation, promoting awareness of plant-based solutions to global challenges.

4) Credit Structure of the S.Y.B. Sc. (Botany) Semester III and IV

No. of Courses	Semester III	Credits	No. of Courses	Semester IV	Credits
A	**Discipline Specific Course (Minor)**		A	**Discipline Specific Course (Minor)**	
1	Plant Resources and Economic Botany	2	1	Medicinal Botany & Current trends in Plant Science	2
2	Plant Resources and Economic Botany Practical	2	2	Medicinal Botany & Current trends in Plant Science Practical	2
Total Credits		**04**	**Total Credits**		**04**

Abbreviations Used

- POs : Program Outcomes
- PS : Program Structure
- PSOs : Program Specific Outcomes
- COs : Course Outcomes
- TLP : Teaching-Learning Process
- AM : Assessment Method
- DSC : Discipline Specific Core
- DSE : Discipline Specific Elective
- GE : Generic Elective
- OE : Open Elective
- VSC : Vocational Skill Course
- SEC : Skill Enhancement Course
- IKS : Indian Knowledge System
- AEC : Ability Enhancement Course
- VEC : Value Education Course
- OJT : On Job Training (Internship)
- FP : Field project
- CEP : Community engagement and service
- CC : Co-curricular Courses
- RM : Research Methodology
- RP : Research Project
- MJ : Major Course
- MN : Minor Course

Program Outcomes (POs)

PO No.	POs Statement After completing the Bachelor of Science Program, students will be able to-	Knowledge and Skill
PO-1	The knowledge of the disciplines and in-depth and extensive knowledge, understanding and skills in a specific field of interest.	Disciplinary knowledge
PO-2	An ability to develop and conduct experiments, analyze, and interpret data and use scientific judgment to draw conclusions	Scientific reasoning
PO-3	An ability to use current technology, and modern tools necessary for creation, analysis, dissemination of information.	Digital literacy
PO-4	Innovative, professional, and entrepreneurial skills needed in various disciplines of science.	Life-long learning
PO-5	An ability to achieve high order communication skills.	Communication skills
PO-6	An ability to collect, analyze and evaluate information and ideas and apply them in problem solving using conventional as well as modern approaches	Problem solving
PO-7	A sense of social responsibility; intellectual and practical skills and demonstration of ability to apply it in real-world settings.	Reflective thinking
PO-8	An ability to engage in independent and life-long learning through openness, curiosity, and a desire to meet new challenges.	Life-long learning
PO-9	A capacity to relate, collaborate, and lead others, and to exchange views and ideas to work in a team to achieve desired outcomes	Teamwork
PO-10	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Leadership
PO-11	An ability to understanding values, ethics, and morality in a multidisciplinary context.	Moral and ethical awareness

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

Arts, Commerce and Science College, New Panvel (Autonomous)

Syllabus for S.Y.B. Sc. (Botany) Semester III

(To be implemented from the academic year 2025-2026)

Course Structure

Course Code: USC3PREBM

Course Title: Plant Resources and Economic Botany

Course Type: Minor **No. of Credits: 4**

Course Code	SEM-III	Credits
USC3PREBM	**Plant Resources and Economic Botany**	**2 Credits (30Lectures)**
Unit-I	**Origin, Conservation, and Importance of Plant Resources**	**15**
1.	**Introduction to Cultivated Plants** • Vavilov's Concept of Origin of Cultivated Plants • Centres of Origin (Primary and Secondary), Centres of Diversity • Harlan's Concept of Gene Pools	
2.	**Plant Genetic Resources** • Importance and Conservation of Plant Genetic Resources • Role of Biodiversity in Economic Botany	
3.	**Major Crop Plants** • Cereals: Wheat, Rice, and Millets (Origin, Evolution, Morphology, Economic Importance) • Legumes: Chickpea, Pigeon Pea, and Other Pulses (Nutritive Value, Economic Importance, Ecological Significance)	
Unit-II	**Commercial Crops and Industrial Plant Products**	**15**
1.	**Sugar and Starch-Yielding Plants** • Sugarcane (Morphology, Products, By-products) • Potato (Tuber Morphology, Anatomy, Economic Uses)	
2.	**Spices and Condiments** • General Account, Importance of Spices (e.g., Clove, Black Pepper, Turmeric, Ginger, Cardamom) • Culinary Herbs and Flavouring Agents (e.g., Vanilla, Saffron, Nutmeg, Cinnamon)	
3.	**Oil-Yielding Plants** • Fatty Oils: Groundnut, Mustard, Coconut, Soybean, (Morphology, Economic Importance) • Essential Oils: Characteristics, Extraction Methods, Economic Significance	

Syllabus for S.Y.B. Sc. (Botany) Semester III and IV

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Structure

Course Code: USC3PREBM

Course Title: Plant Resources and Economic Botany

Course Type: Minor **No. of Credits: 4**

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Understand the origin and genetic diversity of cultivated plants.
CO-2	Recognize the importance of plant genetic resources and biodiversity.
CO-3	Identify major crop plants and explain their economic uses.
CO-4	Analyze the commercial value of plant-based products and oils.

Syllabus for S.Y.B. Sc. Semester III

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Code	SEM-III	Credits
USC3PREBMP	**Plant Resources and Economic Botany**	**2 Credits (60 Hrs)**
1.	**Cereals**: • Wheat (Habit Sketch, L.S/T.S. grain, W.M. starch grains, Micro-chemical tests), • Rice (Habit Sketch, study of paddy and grain, W.M. starch grains, Micro- chemical tests). • Millets - Pearl Millet, Finger Millet and Pseudocereals - Amaranth Grain, • Quinoa (specimens/digital resources and grains)	
2	**Legumes:** • Chickpea, pigeonpea (Habit, fruit, seed structure, Micro-chemical tests).	
3.	**Sugars and Starches** • Sugarcane (Habit Sketch, Products and By-products, Cane Juice-Micro - chemical tests); • Potato (Habit Sketch, Tuber morphology, T.S. tuber to show localization of starch grains, W.M. starch grains, Micro-chemical tests).	
4	**Spices:** • Clove, Blackpepper (Habit and sections L.S./T.S.), Saffron, fennel (specimen/digital resources)	
5.	**Beverages:** • Tea (plant specimen, tea leaves), Coffee (plant specimen, beans)	
6	**Fibres:** • Jute (specimens/digital resources of *Corchorus capsularis* and *C. olitorious*, T.S. stem, test for cellulose and lignin on section of stem and fibre). • Cotton (specimen, W.M. seed to show lint and fuzz; W.M. fibre and test for cellulose)	
7	**Oil-Yielding Plants:** • Fatty Oils: Groundnut (Habit-specimen, Fruit, seeds, Microchemical Tests) • Coconut-Habit (photograph), • Fruit, T.S. nut, Mustard - (Habit- specimen, Fruit, seeds);	

	• Essential Oils: Habit Sketch of Rose, Jasmine, Vetiver, Sandalwood and Eucalyptus (specimens/photographs)	
8	**Drug-Yielding plants:** • Habit - Fever Bark Tree, Poppy, Foxglove and Cannabis (Specimens/ Photographs)	
9	**Tobacco:** • *Nicotiana tabacum* and *N. rustica* (specimens/photographs), Tobacco Products	
10	**Rubber:** • Para Rubber-Habit, Tapping of latex (Specimen/photograph), Rubber Products	
11	**Petro-crops:** • *Saccharum officinarum* , *Jatropha sp* (specimens/photographs	

References Books:

1. Kochhar,S.L. (2012). Economic Botany in Tropics. New Delhi, India: MacMillan & Co.
2. Kochhar, S.L. (2016). Economic Botany – A Comprehensive Study, 5th Edition. New Delhi, India: Cambridge University Press.
3. Wickens, G.E. (2001). Economic Botany: Principles & Practices. The Netherlands: Kluwer Academic Publishers.
4. Chrispeels, M.J., Sadava, D.E. (1994). Plants. Genes and Agriculture. Jones & Bartlett-Publishers.
5. Berg L, (2008). Introductory Botany: Plants, People, and the Environment, Thomson Brooks/Cole.
6. Cook F.E.M. (1995). Economic Botany: Data Collection Standard Royal Botanic Garden, Kew, Richmond

Syllabus for S.Y.B. Sc. (Botany) Semester III

(To be implemented from the academic year 2025-2026)

Course Structure

Course Code: USC4MBCTPSM

Course Title: Medicinal Botany & Current trends in Plant Science

Course Type: Minor **No. of Credits: 4**

Course Code	SEM-IV	Credits
USC4MBCTPSM	**Medicinal Botany & Current trends in Plant Science**	**2 Credits (30 Lectures)**
Unit-I	**Medicinal Botany**	**15**
1.	**Introduction** • Phytoconstituents: Classification, properties, general methods of extraction, plant sources and uses of: alkaloids, tannins, glycosides, essential oils, gums and resins.	
2.	**Medicinal Botany II** Monograph of drugs with respect to Biological source, Geographical distribution, macro and microscopic characters, chemical constituents and therapeutic uses of the following drugs: • Root: .....*Withania somnifera* (Ashwagandha) • Rhizome:..*Zingiber officinale*(Ginger) • Stem bark: *Holarrhena antidysenterica* (Kurchi) • Leaf: .....*Azadirachta indica* (Neem) • Fruit:…..*Foeniculum vulgare* (Fennel) • Seed: .....*Plantago ovata* (Isabgol)	
Unit-II	**Current trends in Plant Science**	**15**
1.	**Controlled Environment Agriculture (CEA)** • Introduction to CEA • Vertical farming • Green house, Poly house • Precision irrigation systems • Techniques for precise nutrient application • Automation technologies in Agriculture	
2.	**Soil Less Farming** • Introduction. • General techniques of Hydroponics, Aeroponics, and Aquaponics • Basics of hydroponics, Aeroponic systems and their applications • Aquaponics and sustainable food production with reference to vegetables	

Syllabus for S.Y.B. Sc. (Botany) Semester IV

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Structure

Course Code: USC4MBCTPSM

Course Title: Medicinal Botany & Current trends in Plant Science

Course Type: Minor **No. of Credits: 4**

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Understand the properties and uses of key phytoconstituents.
CO-2	Analyze the medicinal value of selected plants.
CO-3	Learn modern techniques in Controlled Environment Agriculture (CEA).
CO-4	Explore soil-less farming methods for sustainable agriculture.

Syllabus for S.Y.B. Sc. Semester IV
Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Code	SEM-IV	Credits
USC4MBCTP SMP	**Medicinal Botany & Current trends in Plant Science**	**2.Credits (60Hrs)**
1.	**Medicinal Botany II** Monograph of drugs with respect to Biological source, Geographical distribution, macro and microscopic characters, chemical constituents and therapeutic uses of the following drugs: • Root: .....*Withania somnifera* (Ashwagandha) • Rhizome:--*Zingiber officinale*(Ginger) • Stem bark: *Holarrhena antidysenterica* (Kurchi) • Leaf: .....*Azadirachta indica* (Neem) • Fruit:…..*Foeniculum vulgare* (Fennel) • Seed: .....*Plantago ovata* (Isabgol)	
2.	Study of Greenhouse and Polyhouse Structures	
3.	Demonstration of Vertical Farming Systems	
4.	Precision Irrigation System Setup and Demonstration	
5.	Automated Irrigation System Using Sensors	
6.	Nutrient Management in Controlled Farming	
7.	Study of Different Hydroponic Growing Mediums	
8.	Aeroponic System Demonstration	
9.	Analysis of Water Quality in Hydroponic and Aquaponic Systems	
10.	Effect of Different Light Sources on Plant Growth in a Controlled Environment	
11.	Comparison of Crop Yield in Soil-Based vs. Soil-Less Cultivation	

References Books

1. Trease and Evans' Pharmacognosy – Evans, W.C.
   A comprehensive guide on phytoconstituents and medicinal plant sources.
2. Pharmacognosy – C.K. Kokate, A.P. Purohit & S.B. Gokhale
   Standard Indian text covering monographs, plant drugs, and therapeutic uses.
3. Textbook of Pharmacognosy – T.E. Wallis
   Focus on crude drugs and plant-based medicinal compounds.
4. Medicinal Plants – P.C. Trivedi
   covers traditional uses, chemical constituents, and cultivation.
5. Indian Medicinal Plants – K.R. Kirtikar & B.D. Basu (Volumes I–IV)
   Detailed descriptions of plants, their morphology, and medicinal properties.
6. Hydroponics: A Practical Guide for the Soilless Grower – Howard M. Resh
   Best reference for understanding hydroponics systems and practices.
7. Controlled Environment Agriculture – Chieri Kubota & Merle Jensen
   Covers greenhouse systems, vertical farming, and automation in agriculture.
8. Soilless Culture: Theory and Practice – Michael Raviv & J. Heinrich Lieth
   Comprehensive resource on soilless agriculture and plant production.
9. Aquaponic Gardening – Sylvia Bernstein
   Easy-to-understand guide to aquaponics and sustainable growing.
10. Vertical Farming: Controlled-Environment Agriculture – Dr. Dickson Despommier
    Explores future farming practices, space-efficient methods, and sustainability.

Academic Council Date – 28/04/2025
Item No. –

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

Arts, Commerce and Science College, New Panvel (Autonomous)

Re-accredited A++ Grade by NAAC (Fourth Cycle-CGPA-3.52)
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

As per National Education Policy - 2020

Title of the Programme

B. Sc. in Botany

(Faculty of Science)

Syllabus for T.Y. B. Sc. (Botany)

Semester V and VI

(With effect from the academic year 2025-26)

As per National Education Policy - 2020

Sr. No.	Heading	Particulars
1	**Title of program**	B. Sc.
2	**Eligibility**	Students must have earned mandatory credits of Botany.
3	**Duration of program**	1 Year
4	**Intake Capacity**	40
5	**Scheme of Examination**	Internal: Practical 40Marks External: Theory 60 Marks
6	**Standards of Passing**	40%
7	**Semesters**	V & VI
8	**Program Academic Level**	UG
9	**Pattern**	Revised as per NEP 2020
10	**Status**	New (Approved in BOS and Academic Council)
11	**To be implemented from Academic Year**	Academic Year 2025-26

Signature of

Name
Head, Department of Botany
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Signature of

Prof. (Dr.) S.K. Patil
Principal
Changu Kana Thakur
A.C.S. College, New Panvel
(Autonomous)

Preamble

1) Introduction

This course offers an integrated understanding of Ayurvedic principles in relation to nutrition, health, and disease management. It begins with the foundational concept of Tridosha—Vata, Pitta, and Kapha—and their role in maintaining balance within the body. Emphasis is placed on Rutuchakra (seasonal cycles) and the importance of adapting diet and lifestyle according to seasonal variations. The course explores the Ayurvedic classification of food based on Shadrasas (six tastes) and other factors such as Guna (qualities), Virya (potency), Vipaka (post-digestive effect), and Prabhava (unique action), offering a holistic approach to food selection and planning.

Students will gain practical insights into preparing functional foods, with a focus on immunity-enhancing and iron-rich ingredients commonly used in Ayurveda. In addition, the course includes hands-on methods for estimating proteins and vitamins in food, linking traditional knowledge with modern analytical techniques. Through case studies and practical applications, students will learn to plan Ayurvedic diets tailored for different seasons, constitutions, and health conditions such as anemia and diabetes. Overall, the course bridges ancient Ayurvedic wisdom with modern nutrition science to promote holistic wellness and preventive healthcare.

2) Aims and Objectives

The course aims to provide a foundational understanding of Ayurvedic principles of nutrition and their relevance to human health and wellness. It focuses on the Tridosha theory, seasonal dietary patterns, and the role of taste and food composition in maintaining balance in the body. Students will explore the nutritional value of Ayurvedic herbs and functional foods, understand their role in boosting immunity, and learn dietary approaches to manage common health conditions. Emphasis is also placed on the practical application of Ayurvedic diet planning, preparation, and nutrient estimation techniques to integrate traditional wisdom with modern nutritional science.

Objectives

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

- To explain the Ayurvedic concepts of Tridosha, Rutuchakra, and Shadrasas and their impact on health.
- To classify foods based on Ayurvedic attributes like Guna, Virya, Vipaka, and Prabhava.
- To introduce season-specific diet planning for maintaining Tridosha balance.
- To familiarize students with the nutritional value of Ayurvedic herbs and immunity-boosting foods.
- To provide knowledge of methods for estimating proteins and vitamins in foods.
- To demonstrate practical techniques in Ayurvedic food preparation and dietary interventions.
- To enable students to plan Ayurvedic diets for specific health conditions like anemia and diabetes.

3) Learning Outcomes

After successful completion of this course, students will be able to:

- Understand and explain the Ayurvedic concepts of Tridosha (Vata, Pitta, Kapha) and their role in health and nutrition.
- Analyze the impact of seasonal changes (Rutuchakra) on diet and suggest appropriate seasonal food plans.
- Identify the six tastes (Shadrasas) and classify foods based on Ayurvedic principles such as Guna, Virya, Vipaka, and Prabhava.
- Evaluate the nutritional and medicinal value of Ayurvedic herbs, spices, and functional foods.
- Demonstrate basic techniques for protein and vitamin estimation in food samples.
- Apply Ayurvedic dietary principles to manage common health conditions like anemia and diabetes through case studies.
- Plan and prepare Ayurvedic meals and immunity-boosting recipes, integrating theory with practical applications.

4) Credit Structure of the S.Y.B. Sc. (Botany) Semester III and IV

No. of Courses	Semester III	Credits	No. of Courses	Semester IV	Credits
A	**Discipline Specific Course (Minor)**		A	**Discipline Specific Course (Minor)**	
1	Techniques in Gardening and Propagation	2	1	Nutrition and Health in Ayurveda	2
2	Techniques in Gardening and Propagation Practical	2	2	Nutrition and Health in Ayurveda Practical	2
Total Credits		**04**	**Total Credits**		**04**

Abbreviations Used

- POs : Program Outcomes
- PS : Program Structure
- PSOs : Program Specific Outcomes
- COs : Course Outcomes
- TLP : Teaching-Learning Process
- AM : Assessment Method
- DSC : Discipline Specific Core
- DSE : Discipline Specific Elective
- GE : Generic Elective
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- VSC : Vocational Skill Course
- SEC : Skill Enhancement Course
- IKS : Indian Knowledge System
- AEC : Ability Enhancement Course
- VEC : Value Education Course
- OJT : On Job Training (Internship)
- FP : Field project
- CEP : Community engagement and service
- CC : Co-curricular Courses
- RM : Research Methodology
- RP : Research Project
- MJ : Major Course
- MN : Minor Course

Program Outcomes (POs)

PO No.	POs Statement After completing the Bachelor of Science Program, students will be able to-	Knowledge and Skill
PO-1	The knowledge of the disciplines and in-depth and extensive knowledge, understanding and skills in a specific field of interest.	Disciplinary knowledge
PO-2	An ability to develop and conduct experiments, analyze, and interpret data and use scientific judgment to draw conclusions	Scientific reasoning
PO-3	An ability to use current technology, and modern tools necessary for creation, analysis, dissemination of information.	Digital literacy
PO-4	Innovative, professional, and entrepreneurial skills needed in various disciplines of science.	Life-long learning
PO-5	An ability to achieve high order communication skills.	Communication skills
PO-6	An ability to collect, analyze and evaluate information and ideas and apply them in problem solving using conventional as well as modern approaches	Problem solving
PO-7	A sense of social responsibility; intellectual and practical skills and demonstration of ability to apply it in real-world settings.	Reflective thinking
PO-8	An ability to engage in independent and life-long learning through openness, curiosity, and a desire to meet new challenges.	Life-long learning
PO-9	A capacity to relate, collaborate, and lead others, and to exchange views and ideas to work in a team to achieve desired outcomes	Teamwork
PO-10	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Leadership
PO-11	An ability to understanding values, ethics, and morality in a multidisciplinary context.	Moral and ethical awareness

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

Arts, Commerce and Science College, New Panvel (Autonomous)

Syllabus for S.Y.B. Sc. (Botany) Semester V

(To be implemented from the academic year 2025-2026)

Course Structure

Course Code: USC5TGPM

Course Title: Techniques in Gardening and Propagation

Course Type: Minor **No. of Credits:** 4

Course Code	SEM-V	Credits
USC5TGPM	**Techniques in Gardening and Propagation**	**2 Credits (30 Lectures)**
Unit-I	**Gardening Basics and Nursery Bed Preparation**	**15**
1.	**Introduction to Garden Implements** (3 Lectures) • Identification, uses, and maintenance of gardening tools (pruning shears, trowels, sprayers, etc.) • Safety measures in handling garden implements	
2.	**Potting Mixtures** (4 Lectures) • Components of potting mixtures (soil, sand, compost, vermicompost, etc.) • Characteristics of good potting media • Preparation of suitable potting mixtures for different plants	
3.	**Potting and Repotting Techniques** (4 Lectures) • Steps in potting and repotting • Identification of signs for repotting (e.g., root-bound plants) • Common challenges in potting and repotting	
4.	**Nursery Bed Preparation** (4 Lectures) • Layout and types of nursery beds (raised, flat, and sunken beds) • Soil preparation and treatment for nursery beds • Sowing methods in nursery beds (broadcasting, line sowing, and transplanting)	
Unit-II	**Seed Treatment, Growth Hormones, and Propagation Techniques**	**15**
1.	**Seed Treatment Methods** (4 Lectures) • Importance of seed treatment for better germination • Methods of seed treatment: chemical treatment, bio-priming, and scarification	

	• Common agents used for seed treatment (fungicides, insecticides, etc.)	
2.	**Growth Hormones in Gardening** (3 Lectures) • Role of plant growth hormones (auxins, gibberellins, cytokinins, etc.) • Application of growth regulators in rooting and flowering	
3.	**Techniques of Plant Propagation** (6 Lectures) • Types of propagation: **Sexual propagation**: sowing seeds **Asexual propagation**: cutting, layering, grafting, and budding • Factors affecting success in propagation (season, humidity, etc.) • Hands-on demonstrations of propagation methods	
4.	**Practical Applications in Gardening** (2 Lectures) • Maintenance of propagated plants (watering, fertilization, and pest management) • Planning and organizing a small-scale nursery	

Syllabus for S.Y.B. Sc. (Botany) Semester V

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Code: USC5TGPM

Course Title: Techniques in Gardening and Propagation

Course Type: Minor **No. of Credits:** 4

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Identify and use basic gardening tools and potting techniques.
CO-2	Prepare nursery beds and perform potting and repotting.
CO-3	Apply seed treatment and plant growth hormones.
CO-4	Demonstrate plant propagation methods and nursery management.

Syllabus for S.Y.B. Sc. Semester V

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Code	SEM-V	Credits
USC5TGPMP	**Techniques in Gardening and Propagation)**	**2 Credits (60 Hrs)**
1.	Study of Garden implements.	
2	Preparation of Potting Mixture.	
3.	Potting & Repotting techniques.	
4	Preparation of nursery beds.	
5.	Methods of Seed Treatment.	
6	Application & methods of plant growth regulators.	
7	Perform various methods of cutting.	
8	Perform various methods of layering.	
9	Perform various methods of grafting.	
10	Perform various methods of budding.	
11	Perform propagation by specialized structure- rhizome, suckers, runners, offset, bulb, corm, tuber, etc.	
12.	Visit to Plant nursery.	

Reference Books

1. Adriance, G.W. and F.R. Brison, 1000. Propagation of Horticultural Plants. Biotech Books, New Delhi.
2. Chadha, K.L., P.N. Ravindran and Leela Sahijran (Eds) 1000. Biotechnology in Horticulture and Plantation crops. Malhotra Publishing House, New Delhi.
3. Hartmann, H.T. and D.E. Kester, 1975. Plant Propagation: Principles and Practices. Prentice. Hall, New Delhi.
4. Singh, S.P. 1989. Mist Propagation. Metropolitan Book Co., New Delhi.
5. Wright, R C M. 1974. Simple Plant Propagation. Ward Lock, London.
6. Ropwatika sangpoanp Dr Aba Patil,
7. Ropwatika: Ravindra Katole. Godwa Publication

Syllabus for S.Y.B. Sc. (Botany) Semester VI

(To be implemented from the academic year 2025-2026)

Course Structure

Course Code: USC6NHAM

Course Title: Nutrition and Health in Ayurveda

Course Type: Minor **No. of Credits:** 4

Course Code	SEM-VI	Credits
USC6NHAM	Nutrition and Health in Ayurveda	2 Credits (30 Lectures)
Unit-I	Fundamentals of Ayurvedic Nutrition	15
1.	**Introduction to Tridosha (3 Lectures)** • Concept of Vata, Pitta, and Kapha • Role of Tridosha in maintaining health and nutrition	
2.	**Rutuchakra and Seasonal Diets (4 Lectures)** • Seasonal variations (Rutuchakra) and health impacts • Diet and lifestyle for different seasons	
3.	**Taste and Food Composition in Ayurveda (4 Lectures)** • The six tastes (Shadrasas) and their role in balancing Tridosha • Food classification: Guna, Virya, Vipaka, and Prabhava	
4.	**Food Selection and Planning (4 Lectures)** • Identifying foods for seasons and Tridosha balance • Case studies on Ayurvedic food planning	
Unit-II	Functional Foods, Immunity, and Disease Management	15
1.	**Immunity-Boosting and Iron-Rich Foods (4 Lectures)** • Preparing immunity-enhancing recipes • Nutritional value of Ayurvedic herbs and spices	
2.	**Protein and Vitamin Estimation in Foods (3 Lectures)** • Methods for protein estimation (e.g., Kjeldahl method) • Methods for vitamin estimation (e.g., colorimetric techniques)	

3.	**Ayurvedic Approach to Disease Management (4 Lectures)** • Role of diet in managing anemia, diabetes, and other ailments • Case studies on Ayurvedic dietary interventions	
4.	**Practical Applications (4 Lectures)** • Demonstrations of food preparation • Hands-on nutrient estimation • Planning Ayurvedic diets for specific health conditions	

Syllabus for S.Y.B. Sc. (Botany) Semester V

Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Code: USC5TGPM

Course Title: Techniques in Gardening and Propagation

Course Type: Minor **No. of Credits:** 4

Course Outcomes (Cos)

CO No.	COs Statement
	After completing the Bachelor of Science Program, students will be able to-
CO-1	Understand Ayurvedic concepts of health and nutrition.
CO-2	Apply Ayurvedic diet planning based on seasons and body types.
CO-3	Identify immunity-boosting foods and perform nutrient estimations.
CO-4	Use Ayurvedic diets for managing common health conditions.

Syllabus for S.Y.B. Sc. Semester VI
Choice Based Credit System
Under New Education Policy (NEP) 2020
(To be implemented from the academic year 2025-2026)

Course Code	SEM-VI	Credits
USC6NHAM	**Nutrition and Health in Ayurveda**	**2 Credits (60 Hrs)**
1.	Study of Tridosha concept (Prakriti nidaan)	
2	Study of Ahar According to Different Prakriti.	
3.	Study of sattvic, tamasic and Rajasic foods (any two examples of each)	
4	Identification of foods as per rutuchakra	
5.	Study of food based on six taste (Rasa) (two examples of each).	
6	Preparation of Iron rich ayurvedic aahar (Nachani satva, aliv laddu)	
7	Preparation of immunity boosting dish (amala palak, amala candy)	
8	Making a diet plan to manage diseases (diabetes, constipation) with ayurvedic aahar.	
9	Study of Examples of incompatibility / antagonistic (*Viruddha-Aahara*)	
10	Estimation of Proteins from plant resources used in ayurvedic aahar (Lowry's method)	
11	Estimation of vitamin C from fruits. (Amla, Citrus)	
12.	Study (identification) of Fiber rich vegetables (carrot, sweet potato), leafy vegetables (spinach, fenugreek) and dalia	

Reference Books

1. Mukund Sabnis (2012). Viruddha Ahara: A critical view. AYU | Jul-Sep 2012 | Vol 33 | Issue 3.
2. Chetan Ram Meghwal, Vikram singh, Mamta kumara meena, Ashok Kumar Sharma, K. L. Sharma, Rekhraj meena, Ayushi Nigam. (2023). A Review Study of Food According to Prakriti and Doshas. International Research Journal of Ayurveda & Yoga Vol. 6 (1),56-59.
3. Pradeep Kumar Suryawanshi. Ahara (Ancient Secret of Diet in Ayurveda & Yoga), Chaukhamba Surbharati Prakashan
4. P.H. Kulkarni. Ayurvedic Aahar: The Scientific Diet. Sri Satguru Publications
5. Dr. Ganesh Karajkhede. Ayurvediya Ahar Vimarsh. N M Publications.
6. Rastogi S {2014) Ayurvedic Science of Food and Nutrition. ASIN: BOOHWMV094, Springer: ISBN-13:978-1461496274
7. Rastogi S (2010) Building bridges between Ayurveda and modern science. Int J Ayurveda Res. 1(1):41-46.
8. FSSAI regulations on Ayurveda Aahar Regulations 2022. Gazette of India CG-DL-E-07052022-235642. New Delhi, Friday, May 6, 2022/ Vaisakha 16, 1944.
9. Frawley D (2012) Ayurvedic healing: A comprehensive guide. Lotus Press, India.
10. https:/ /iksindia.org/: Indian Knowledge Systems