



Vitthalbhai Patel & Rajratna P. T. Patel Science College
(Autonomous)
(Reaccredited with 'A' Grade by NAAC (CGPA 3.13))
Affiliated to SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
Syllabus effective from the Academic Year 2025-2026



(Bachelor of Science)(Undergraduate)
B. Sc. (UG) Semester-III

Course Code	US03MABOT01	Title of the Course	ECONOMIC BOTANY
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	To make students familiar with: Students will be able to understand basic knowledge about cereals, legumes, spices, beverages, rubber, timber and fiber yielding plants and their economic importance.
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Course Content		
Unit	Description	Weightage* (%)
1.	Introduction with their distribution, botanical name, family, parts used and economic importance of followings: Cereals: Wheat, Rice, Barley, Oats. Millet: Pearl millet, Sorghum, Finger Millet Legumes: Chick pea, Pigeon pea, Pea, Green gram, Black gram.	25%
2.	Sources of sugars and starches: Morphology and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation & uses. Spices: Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper	25%
3.	Beverages: Tea, Coffee (morphology, processing & uses) Natural Rubber: Para-rubber: tapping, processing and uses. Timber plants: General account (List important timber plants with their botanical names and family) with special reference to teak. Fibers: Classification based on the origin of fibers; Cotton, Coir and Jute (morphology, extraction and uses).	25%

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4.	Sources of oils and fats: General description, classification, extraction, their uses and health implications of groundnut, coconut, linseed, soybean, mustard, sesame and coconut (Botanical name, family & uses). Essential Oils: General account, extraction methods, comparison with fatty oils & their uses.	25%
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Teaching-Learning Methodology	Classroom interactions, Chalk and talk Multimedia presentation Chart/model presentation Live /preserved specimen observation Student seminar and unit test, quiz etc Question bank circulation Students assignments Student counselling for any problem of subject understanding Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)
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Evaluation Pattern		
Sr. No.	Details of the Evaluation –NEP 2020, KCG and CCE (Continuous and Comprehensive Evaluation.	Weightage (%)
1.	Internal Examination Evaluation includes Class Test (At least one)-15(30%), Quiz (At least one)-15(30%), Active learning-05(10%), Home Assignment-05(10%), Class Assignment-05(10%), Attendance-05(10%) This makes total 50 Marks.	50
2.	Semester End Examination(50 Marks)	50

Course Outcomes:	
1.	Increase the awareness and appreciation of plants & plant products encountered in everyday life
2.	Get brief idea about traditional botany.
3.	Explore the economic importance of major crops.

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4	Aware about Brief idea on some Nutraceutical rich supplements, with applications of Nutraceutical in daily life.
5.	Appreciate the diversity of plants and the plant products in human use

Suggested Reference Books:

Sr. No.	Reference Books
1.	Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2.	Kokate, Purohit and Gokhle, Pharmacognosy
3.	Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
4.	Chrispeels, M.J. and Sadava, D.E. 1994 Plants, Genes and Agriculture. Jones & Bartlett Publishers.

On-line Resources :GOOGLE BOOKS,INFLIBNET,GOOGLE WEB,SHODHGANGA

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(Bachelor of Science)(Undergraduate)
B. Sc. (UG) Semester-III

Course Code	US03MABOT02	Title of the Course	PLANT MORPHOLOGY AND TAXONOMY
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To study morphology of angiosperm plants. 2. To learn technical terms to describe morphological features. 3. To learn how to describe an angiosperm plant in a technical language.	To make student
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Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to Plant Morphology: Habit of the plant: Herb, Shrub, Tree parasitic, myco-heterotrophic and epiphytic plants. Importance of plant morphology, Parts of an angiosperm plant. Morphology of Root: Characteristics of roots, Types of root system, Regions of the root, Modifications of root. Morphology of Stem: Characteristics of stem, Forms of stem, Bud and its modifications, Modifications of stem, Types of branching.	25%
2.	Morphology of Leaf: Parts of a leaf, types of leaves, types of stipules and their modifications, leaf blade with ref. to apex, margin, and shape. Venation, Simple and compound leaves, Modifications of leaves, Phyllotaxy, Functions of leaves. The Inflorescence: Definition, Classification of inflorescences, Racemose and its types, Cymose and its types and special types of inflorescence.	25%
3.	The Flower: Flower as a modified shoot, structure of flower, types of flower, thalamus, bracts, Symmetry of the flower, Calyx and corolla: its modifications and forms. Androecium: Parts of stamen, cohesion of stamens, adhesion of	25%

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	stamens, length of stamens, Gynoecium: Parts of carpel, simple and compound gynoecium, cohesion of carpels, placentation and its types. The Fruit: Definition, Parts of fruit, Classification of fruits, Dispersal of seeds and fruits. The Seed: Definition, Parts of dicotyledonous and monocotyledonous seeds, Seed germination and its types.	
4.	Systematic Learning approach for Angiosperm: General characteristics and Life cycle of an angiosperm plant. Outline Classification of Bentham and Hooker, merits and demerits of B & H classification. Techniques for Herbarium preparation and Herbaria of the world and India. How to describe an angiosperm plant? -General characters with economic importance of the following families: Dicotyledonae: <u>Polypetlae:</u> Malvaceae, Meliaceae, Fabaceae, Cucurbitaceae <u>Gamopetalae:</u> Rubiaceae, Solanaceae <u>Monochlamydeae:</u> Euphorbiaceae Monocotyledonae: Gramineae (Poaceae)	25%

Teaching-Learning Methodology	Classroom interactions, Chalk and talk Multimedia presentation Chart/model presentation Live /preserved specimen observation Student seminar and unit test, quiz etc Question bank circulation Students assignments Student counselling for any problem of subject understanding Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)
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Evaluation Pattern		
Sr. No.	Details of the Evaluation –NEP 2020, KCG and CCE (Continuous and Comprehensive Evaluation.	Weightage (%)
1.	Internal Examination Evaluation includes Class Test (At least one)-15(30%), Quiz (At least one)-15(30%), Active learning-05(10%), Home Assignment-05(10%), Class Assignment-05(10%), Attendance-05(10%) This makes total 50 Marks.	50

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2.	Semester End Examination(50 Marks)	50
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Course Outcomes: Having completed this course, the learner will be able to

1.	Understand plant morphology
2.	Understand basics of floral morphology
3.	Understand how plant morphology relates to plant reproduction
4.	Understand significance of morphological modifications of plant parts
5.	Have foundation for a course on Plant Systematics

Suggested Reference Books:

Sr. No.	Reference Books
1.	Botany for Degree Students, A.C.Dutta, Oxford University Press
2.	Morphology and Economic Botany of Angiosperms, S Sundararajan, Anmol Publications Pvt Ltd
3.	Morphology of Vascular Plants, E.J.Eames, Standard University Press
4.	Taxonomy of Angiosperms, V. N. Naik, Tata Mc GrawHill Publishing Comp
5.	Taxonomy of Angiosperms, V. Singh and D. K. Jain, Rastogi Publications
6.	A Text Book of Botany- Angiosperms, B. P. Pandey, S. Chand and Comp. Ltd
7.	A Text Book of Practical Botany II, Ashok Bendre and Ashok Kumar, Rastogi Publication
8.	Taxonomy of Vascular Plants, GHM Lawrence, Scientific Publishers

On-line Resources :GOOGLE BOOKS,INFLIBNET,GOOGLE WEB,SHODHGANGA

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(Bachelor of Science)(Undergraduate)
B. Sc. (UG) Semester-III

Course Code	US03MABOT03	Title of the Course	Practical
Total Credits of the Course	04	Hours per Week	08(PartA-4 and PartB-4)

Course Objectives:	1. To get hands on training to use various botany laboratory equipment. 2. To do experiment as per the given syllabus through fresh/preserved specimen/slides/models/charts etc
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PART-A	SECTION-I CREDIT-2 PRACTICAL-4 HOUR
1.	Study of root and its modifications.
2.	Study of stem and its modifications.
3.	Study of leaf and its modifications (stipules, venation, simple leaf and types of compound leaves, leaf shapes, leaf margins, leaf apices)
4.	Study of Phyllotaxy (Distichous, tristichous, penta-stichous, opposite decussate, opposite superposed, whorled)
5.	Study of Inflorescences(Racemose, cymose, special types)
6.	Study of flowers (Bract and bracteoles, attachment of flower, presence of floral whorls, symmetry, presence of reproductive organs, number of floral parts, position of floral organs on thalamus, perianth, tepals, aestivation)
7.	Study of Androecium, Gynoecium and placentation.
8.	Study of fruits (simple, aggregate and composite)
9.	Study of seed parts (dicot, monocot) and types of germination.

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10.	Study the Signs and symbols to construct floral formula and draw floral diagram.
11.	Taxonomical study of plants belongs to families which included in your theory syllabus. (Malvaceae, Fabaceae, Cucurbitaceae, Rubiaceae, Solanaceae)
12.	Botanical excursion (Students are expected to visit nearby forest area or area of botanical interest for field experience. Prepare the excursion report and submit
PART-B	SECTION-II CREDIT-2 PRACTICAL-4 HOUR
1	Cereals: Wheat and Rice (habit sketch, study of starch grains, micro-chemical tests).
2	General study of Millets (habit sketch, study of starch grains and micro-chemical tests).
3	Legumes: Soybean, Groundnut, (habit, fruit, seed structure, micro-chemical tests).
4	Sources of sugars and starches: Sugarcane, Potato (habit sketch; starch grain-micro-chemical tests),
5	Spices: Black pepper, Fennel and Clove (habit and sections).
6	Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans).
7	Sources of oils and fats: Coconut- T.S. nut, Mustard–plant specimen, seeds; tests for fats in crushed seeds
8	Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Eucalyptus (specimens/photographs).
9	Rubber: specimen, photograph/model of tapping, samples of rubber products.
10	Woods: Specimen

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11	Fiber-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).
12	To prepare checklist of plants of your own campus and submit during examination.
13	Learn to prepare herbarium sheets and digital submission.

Teaching-Learning Methodology	Observation of specimen Handling of specimen Using student's microscope Using certain required chemical for test Dissection of specimen Preparing journal though drawing various figures with description Learn through charts/model Field visits for live experience. Preparing field visit note.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation –NEP 2020, KCG and CCE (Continuous and Comprehensive Evaluation.	Weightage%
1.	Internal Examination Evaluation includes Lab Work Assignment-20(40%), Viva voice/Lab Quiz-20(40%), Attendance-10(20%) Which makes total 50 Marks.	50
2.	Semester End Examination Evaluation includes Lab Work Assignment-40(80%), Viva voice/Lab Quiz-10(20%) This makes total 50 Marks.	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand morphology of all plant parts.
2.	Describe vegetative and floral characters of an angiosperm plants



Suggested Reference Books:

Sr. No.	Reference Books
1.	A text book of Practical Botany(vol I&II) by Bendre and Kumar
2.	Modern Practical Botany(vol I&II)byPandey B.P.

On-line Resources : <https://www.wiziq.com/tutorials/practical>



(Bachelor of Science)(Undergraduate)
B. Sc. (UG) Semester-III

Course Code	US03IDBOT01	Title of the Course	CHEMOINFORMATICS IN PLANT SCIENCES
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	• Understand the scope and significance of chemoinformatics, particularly in plant science. • Become familiar with key chemoinformatics tools and databases. • Utilize molecular docking for plant-based drug discovery. Develop and interpret basic QSAR models for predicting bioactivity.
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Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to Chemoinformatics: • History and evolution of chemoinformatics. • Definition and scope of chemoinformatics • The role of chemoinformatics in modern plant science • Prospects of chemoinformatics. Introduction of Key techniques and tools in chemoinformatics • Molecular databases • Structure-activity relationship (SAR) analysis • Chemoinformaticstools:PubChem, ChemSpider, ChEMBL,Drugbank,PDB,ZINC	50%
2.	Searching Chemical Structures: Full structure search, Sub-structure search, Basic ideas and similarity search Case studies: Resveratrol, curcumin, and other plant-derived therapeutic. • Introduction to structure descriptors, Data visualization	50%

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	techniques. • Molecular docking and its application in plant-based drug discovery • QSAR (Quantitative Structure-Activity Relationship) modeling for plant bioactive compounds Ethical Considerations and Future Directions • Ethical concerns in the use of plant-derived molecules for pharmaceutical purposes • The role of chemoinformatics in sustainable agriculture and conservation • Future prospects of chemoinformatics in the exploration of plant biodiversity	
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Teaching-Learning Methodology	Classroom interactions, Chalk and talk Multimedia presentation Chart/model presentation Live /preserved specimen observation Student seminar and unit test, quiz etc Question bank circulation Students assignments Student counselling for any problem of subject understanding Student-Teacher interaction on social media platform for any query (MS team, Google classroom, email, etc)
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Evaluation Pattern		
Sr. No.	Details of the Evaluation –NEP 2020, KCG and CCE (Continuous and Comprehensive Evaluation.	Weightage (%)
1.	Internal Examination Evaluation includes Class Test (At least one)-10(40%), Quiz (At least one)-05(20%), Home Assignment-05(20%), Attendance-05(10%) Which makes total 25 Marks.	50
2.	Semester End Examination(25 Marks)	50

Course Outcomes: Upon completion of this course, the students will be able to:

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1.	Comprehend the role and evolution of chemoinformatics in plant science.
2.	Effectively use fundamental chemoinformatics databases and tools.
3.	Proficiently utilize chemoinformatics tools to predict and identify novel bioactive molecules from plant sources.

Suggested Reference Books:

Sr. No.	Reference Books
1.	Andrew R. Leach & Valerie, J. Gillet (2007) An introduction to Chemoinformatics. Springer: The Netherlands.
2.	Gasteiger, J. & Engel, T. (2003) Chemoinformatics: A text-book. Wiley-VCH.
3.	Gupta, S. P. (2011) QSAR & Molecular Modeling. Anamaya Pub.: New Delhi.
4.	Online databases: PubChem, ChemSpider, KNApSACk

On-line resources : Shodhganga, INFLIBNET

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(Bachelor of Science)(Undergraduate)
B. Sc. (UG) Semester-III

Course Code	US03IDBOT02	Title of the Course	Practical
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	- Understand the scope and significance of chemoinformatics, particularly in plant science. - Become familiar with key chemoinformatics tools and databases. Utilize molecular docking for plant-based drug discovery. Develop and interpret basic QSAR models for predicting bioactivity.
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No	Practical
1.	To study & to analyze the information from the various chemical databases available on the World Wide Web.
2.	Knowledge of Various Chemical File Formats
3.	Retrieval of Information about given Chemical Compounds
4.	Molecular Representation (SMILES & InChI)
5.	Molecular Descriptors and Fingerprints
6.	Molecular Docking (Introduction)
7.	Structure-Activity Relationship (SAR) Analysis (Case Study: Flavonoids)
8.	Database Integration (PlantCyc and ChemSpider)
9.	Introduction to QSAR
10.	Submission

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Teaching-Learning Methodology	Observation of specimen Handling of specimen Using student's microscope Using certain required chemical for test Dissection of specimen Preparing journal though drawing various figures with description Learn through charts/model Field visits for live experience. Preparing field visit note.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation –NEP 2020,KCG and CCE(Continuous and Comprehensive Evaluation.	Weightage%
1.	Internal Examination Evaluation includes Lab Work Assignment-10(40%), Viva voice/Lab Quiz-10(40%), Attendance-05(20%) This makes total 25 Marks.	50
2.	Semester End Examination Evaluation includes Lab Work Assignment-20(80%), Viva voice/Lab Quiz-05(20%), Which makes total 25 Marks.	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	Comprehend the role and evolution of chemoinformatics in plant science.
2.	Effectively use fundamental chemoinformatics databases and tools.
3.	Proficiently utilize chemoinformatics tools to predict and identify novel bioactive molecules from plant sources.

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