KSKV Kachchh University, Bhuj - Kachchh

B.Sc. (Botany) Syllabus as CBCS System

Semester I to VI (w .e. f. June 2016)

Botany Course outcomes

Core competency: Students will acquire core competency in the subject Botany. The Bachelor program in Botany and Botany honours may be mono-disciplinary or multidisciplinary.

- To provide thorough knowledge about various plant groups from primitive to highly evolved.
- To make the students aware of applications of different plants in various industries.
- To highlight the potential of these studies to become an entrepreneur.
- To equip the students with skills related to laboratory as well as field based studies.
- To make the students aware about conservation and sustainable use of plants.
- To create foundation for further studies in Botany.
- To address the socio-economical challenges related to plant sciences.
- To facilitate students for taking up and shaping a successful career in Botany.
- Discipline specific competitive exams conducted by service commission.

Paper no.	Paper Name (Theory & Practical)	Programme Outcomes (POs)
USCEBO-101	**Plant Diversity and Cytogenetics**	**Unit-1 Plant Diversity :**
		• **After reading this unit students will be able:** To explain main characters , differences and comparative characters of algae to angiosperm,
		• Approach to explain the evolution of organism and understand the genetic diversity on the earth.
		• To understand different branches of botany and scope in botany.
		• To understand the useful and harmful effects of Bacteria and Viruses.
		Unit-2 Thallophyta and Bryophytes:
		• This unit describes- general features, classification given by G. M. Smith and life- cycle of Thallophyta and Bryophytes.
		• After reading this unit students will be able to: describe habit , habitat ,characteristics and classification of Thallophyta and Bryophytes.
		• Analyze the distribution and economic importance of Thallophyta and Bryophytes .
		Unit-3 Morphology and Taxonomy:
		• **After reading this unit students will be able:** To explain main characters, differences and comparative characters of angiosperm plants .
		• To know the vegetative characteristics of the plant.
		• To learn about the reproductive characteristics of the plant.
		• To understand the plant morphology.

		• Able to draw floral formula and floral diagram of angiosperms.
		• **After reading this unit students will be able to:** describe habit and habitat of some angiosperm families.
		Unit-4 Cell biology and Genetics
		• Students will be able to understand the structures and basic components of prokaryotic and eukaryotic cells.
		• To understand the cellular components involved in cell division.
		• To understand basic structure of Nucleic acids, types of DNA & RNA and DNA replication.
		• To understand the process of protein synthesis and role of genetic code in polypeptide formation.
USCEBO - 202	Pteridophytes, Gymnosperm, Anatomy, Ecology, Physiology, Biochemistry and Applied botany	**Unit – 1 Pteridophytes and Gymnosperms**
		• After reading this unit students will be able: to explain habit and habitat of pteridophyte & Gymnosperm, their characteristics and classification given by G.M.Smith.
		• Understand the phenomenon of heterospory in pteridophytes and its significance.
		• Explain life-cycle in pteridophyte sang gymnosperm plant.
		Unit – 2 Anatomy & Ecology
		• After reading this unit students will be able: to explain Characteristics & Classification of plant tissue.
		• Know various tissue systems. Understand the normal and anomalous.
		• Difference between Normal & Anomalous secondary plant growth
		• Also understand what is Ecosystem and Structure and Ecological adaptations in Hydrophytes, Xerophytes and Halophytes.
		Unit – 3 Physiology and Biochemistry
		• Students will be able: to understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.
		• To understand the plants and plant cells in relation to water.
		• To understand Laws of thermodynamics and their application in plant science.
		Unit – 4 Plant resources & Applied Botany
		• Students will be able to understand the importance and scope of botanical science in the industries.
		• To understand the role of microbial plants in fermentation process and process of cultivation of cash crops.
		• To understand some plants which are used as Medicinal plants, Food Plants and source of Natural Rubber.

USCEBO – 303	**Cryptogamic Botany**	**Unit – 1 Algae**
		• Students will be able to understand about habit, habitat, life cycle of some algae.
		Unit – 2 Fungi
		• Students will be able to understand about habit, habitat, life cycle of some fungi.
		• Understand the features of Lichens.
		. **Unit – 3 Bryophytes**
		• Students will be able to understand about habit, habitat, life cycle of some bryophytes
		Unit – 4 Pteridophytes
		• This unit describes general features, classification, given by G.M.Smith (Algae, Bryophytes, Pteridophytes) and Aniswarth (Fungi)
USCEBO – 304	**Gymnosperms,Systematic Botany & Cyto-genetics**	**Unit – 1 Gymnosperms**
		• **After reading the unit students will be able**: to explain habit and habitat of pteridophyte & Gymnosperm, their characteristics and classification given by G. M. Smith.
		• To understand the life cycles of Pinus.
		Unit – 2 Systematic Botany
		• **After reading the unit students will be able**: to understand Bentham and Hooker's classification system.
		• To understand Aestivation in flower ,Buds (Types & modifications) , Adhesion & Cohesion in flower.
		• General characters, floral structure, floral diagram, floral formula, common examples of economic and ethno botanical important plants of some families.
		Unit-3 Cell biology
		• **Students will be able to** gain knowledge about "Cell Science".
		• To understand the structure and purposes of basic components of prokaryotic and eukaryotic cells,
		• To understand the cellular components.
		• To understand basic structure and function of cell organelles.
		• To understand Cell wall, Plasma membrane and Cell organelles.
		• To learn the scope and importance of molecular biology.
		Unit – 4 Genetics

		• **After reading these unit students will be able**: to understand Mendelian genetics.
		• To understand about sex determination in plants and its importance.
		• To learn about the extra-chromosomal inheritance in plant cell.
USCEBO - 405,	**Anatomy, Embryology, Physiology & Biochemistry**	**Unit – 1 Anatomy**
		• Students will be able to understand the scope & importance of Anatomy in plants.
		• To know various tissue systems.
		• To study epidermal tissue system and mechanical tissue system.
		• To understand the normal and anomalous growth in plants.
		• Anomalous secondary growth in plants and their causes.
		• To perform the techniques in anatomy.
		Unit – 2 Embryology
		• Students will be able to understand the scope & importance of Embryology.
		• To understand structure and development of microsporangium and megasporangium.
		• To understand microsporogenesis and megasporogenesis.
		• To understand male and female gametophytes.
		• To know Pollination, fertilization, endosperm and embryogeny.
		Unit – 3 Physiology
		• Students will be able to know the importance and scope of plant physiology.
		• To understand the plants and plant cells in relation to water.
		• To understand transpiration, its types and mechanism of transpiration, factors affecting transpiration & its significance.
		• To understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
		• To learn about the movement of sap and absorption of water in plant body.
		• To understand the plant movements.
		Unit – 4 Biochemistry
		• Students will be able to understand the importance of Protoplasm as a colloidal system.

		• To understand the current status of Biochemistry.
		• To recognize the impact of Biochemistry on socioeconomic aspects of life.
		• To realize the industrial application of Biochemistry.
		• To understand the importance of Bio-molecules.
USCEBO - 406	**Ecology, Plant Resources & Applied Botany**	**Unit – 1 Plant Ecology**
		• Students will be able to know the scope and importance of the discipline.
		• To understand Characteristics & Ecological Hierarchy.
		• To understand atmosphere and environmental factors and its Inter specific interactions
		• To understand plant communities and ecological adaptation in plants
		• To understand Composition of soil, Soil profile, Formation of soil (Pedogenesis), Morphology(Classification), Physical & Chemical properties of soil.
		Unit – 2 Ecosystem
		• Students will be able to know the scope and importance of the discipline.
		• To understand the concept o f Ecological pyramids.
		• To know the nature and its co-relation with human society.
		• To understand Flow of energy and Bio-Geochemical Cycle .
		• To understand Natural Ecosystem types and its components.
		Unit – 3 Plant Resources
		• Students will be able to gain thorough knowledge about various plant resources.
		• To become aware of applications of different plants in various industries.
		• To become aware of some important plants Botanical names, family, morphology, sources & economic importance.
		• To understand the importance and scope of botanical science in the industries.
		• To understand the role of microbial plants in fermentation process.
		• To know the process of cultivation of cash crops.
		• To understand some plants which are used as herbal cosmetics, dyes , Insecticides, fibers.etc…
		Unit – 4 Applied botany (Advance techniques in Botany)

		• Students will be able to understand some Advance techniques in Botany.
		• To highlight the potential of these studies to become an entrepreneur.
		• To equip the students with skills related to laboratory as well as industries based studies.
		• To understand technique of plant tissue culture and its application.
		• To understand the process of cultivation of cash crops used in horticulture and floriculture.
		• To understand scope, importance & disciplines of horticulture, floriculture, bonsai and Hydroponics.
		• Application of remote sensing in daily life.
USCEBO-507,	**Plant Diversity**	**Unit-1 Algae: Life History; Structure & Reproduction**
		• Students will be able to understand the habit, habitat, structure, reproduction and life cycle of some algae.
		Unit-2 Fungi: Life History; Structure & Reproduction
		• Students will be able to understand the habit, habitat, structure, reproduction and life cycle of some fungi.
		Unit-3 Bryophytes: Life History; Structure & Reproduction
		• Students will be able to understand the habit, habitat, structure, reproduction and life cycle of bryophytes.
		Unit-4Pteridophytes : Life History; Structure & Reproduction
		• Students will be able to understand Habitat, Habit and life cycle of pteridophytes.
		• To understand types of Stele and evolution of stele in pterdophytes.
		• To understand types and Formation of fossils.
USCEBO-508,	**Systematic Botany, Angiosperms, Embryology and Anatomy**	**Unit-1 Systematic Botany**
		• **After reading these unit students will be able**: to compare Merits & Demerits of System of classification of Bentham & Hooker, Engler & Prantle.
		• To know about ICBN.
		• To understand various rules, principles and recommendations of plant nomenclature.
		• To know modern trends in taxonomy.
		• To understand Herbarium Techniques and Role of Herbaria and Botanical gardens in study.
		Unit-2 Angiosperms
		• **After reading this unit students will be able:** To understand the diversity of angiosperms.

		• To explain main characters, draw floral formula and floral diagram of some families.
		• To understand the comparative account among the families of angiosperms.
		• To know the economic importance of the angiosperm plants.
		• To know the distinguishing features of angiosperm families.
		Unit-3 Embryology
		• Students will be able to understand the scope, Application of Palynology in Taxonomy, coal, oil Exploration and forensic science.
		• To understand Endosperms Types and its functions.
		• To understand Embryo development in Dicotyledons and monocotyledons.
		• To gain knowledge about Polyembryony and importance of polyembryony.
		• To understand importance and application of Apomixis, Apospory, parthenogenesis in plant science.
		Unit-4 Anatomy
		• **After reading this unit students will be able**:
		• To understand Microtomy & Methods of Slide preparation.
		• To gain knowledge about abnormal behavior of cambium in some plants.
		• To understand about Lateral root, root hairs and Root-Stem transition.
USCEBO-509	**Ecology, Plant Resources & Applied Botany**	**Unit-1 Plant Physiology**
		After reading this unit students will be able
		• To understand about seed Dormancy, Methods of breaking dormancy.
		• To understand Different phases and Factors affecting on seed germination.
		• To understand Role of PGRs (Auxin , Gibberellins, Cytokinin, Abscisic acids and Ethylene) in plant life.
		• To understand about Pentose Phosphate Pathway, R.Q and Factors affecting RQ.
		Unit-2 Biochemistry
		• **After reading this unit students will be able**
		• To understand secondary Metabolites in plants like Alkaloids, Terpenoids and Phenolics.
		• To understand Lipid metabolism in plants, Alpha & Beta-oxidation.

		• To understand Amino acid & Protein metabolism.
		Unit-3 Genetics & Molecular biology
		• **After reading this unit students will be able**
		• To understand the molecular biology in relation to genetic material, its inheritance, modification, replication and repair.
		• To understand transcription, translation, Chromosomal mutation.
		• To know gene regulation in prokaryotes and eukaryotes.
		• To know DNA finger printing & its importance.
		• To know DNA damage & repair.
		Unit-4 Biotechnology & Industrial Botany
		• **After reading this unit students will be able**
		• To understand the fundamentals of totipotency and plant tissue culture techniques.
		• To know the transgenic technology for the improvement of quality and quantity of plant and their product.
		• To understand the advantages of in vitro propagation in various areas
		• To realize the application and importance of plant tissue culture and transgenic plants.
		• To gain thorough knowledge about various plant groups from primitive to highly evolved plants.
		• To become aware of applications of different plants in various industries.
		• To highlight the potential of these studies to become an entrepreneur.
		• To equip the students with skills related to laboratory as well as industries based studies.
		• To make the students aware about conservation and sustainable use of plants.
		• To address the socio-economic challenges related to plant sciences.
USCEBO-610,	**Ecology, Environment & Human Welfare**	**Unit-1 Ecology**
		• **After reading this unit students will be able** to understand the Community Ecology and Population Ecology (Types & Characteristics)
		• To understand about Classification, Structure of biotic community.
		• To understand the Character used in Community and Methods to study community.
		Unit-2 Ecological Succession

		• **After reading this unit students will be able** to understand concept of Climax theory.
		• To understand the Basic types of succession.
		• To understand the General process of Ecological Succession (Hydrosere, Xerosere)
		Unit-3 Environmental Biology& Waste Management
		• **After reading this unit students will be able** to understand the environmental botany.
		• To know the nature and its co-relation with human society.
		• To realize the impact of human activities on environment.
		• To understand global issues concerned with environment.
		• To know the sustainable development and care of environment.
		• To understand the connection between material, wealth & resources exploitation.
		• Worth the relationship between economic growth and environmental degradation.
		Unit-4 Human Welfare
		• **After reading this unit students will be able** to understand our Natural Resources.
		• To understand about Afforestation, Deforestation.
		• To know the Concept of Threatened Species.
		• To know about the Agencies working for Protection\ Conservation.
		• To Know about Biosphere Reserve, National Park, Sanctuary in India and Gujarat.
USCEBO-611	**Gymnosperms, Phytogeography & Applied Botany**	**Unit-1 Gymnosperms**
		• Understand Gymnosperms with respect to PALEOBOTANY distinguishing characters
		• Understand the life cycles of Ginkgo and Ephedra
		• Know the scope of Paleobotany, Techniques for studing fossil
		• Understand the various fossil genera, representing different fossil groups of Pteridophytes and Gymnosperms
		Unit-2 Phytogeography
		• Students will be able to know Geographic & Bathymetric Distribution.
		• To know Major Plant Communities of World, India & Gujarat.

		• To discover botanical regions of India and vegetation types of Gujarat and India.
		• To Know about Endemism , types of Endemism and some endemic plant of kachchh and Gujarat.
		Unit-3 Plant Breeding
		• Students will be able to know the concept of plant Breeding.
		• To know the Selection methods of plants.
		• To know types & methods of Hybridisation.
		• To know Apomixis, Development, Potential for crop improvement.
		• To introduce the student with branch of plant breeding for the survival of human being from starvation.
		• To study the techniques for production of new superior crop varieties.
		Unit-4 Applied Botany
		• Students will be able to gain thorough knowledge about various plant groups from primitive to highly evolved Ethnobotanical plants.
		• To highlight the potential of these studies to become an entrepreneur.
		• To make the students aware about conservation and sustainable use of plants.
		• To address the socio-economic challenges related to plant sciences.
		• To know Plants used by Tribes of Gujarat.
		• To know the concept of garden.
		• To study the special types of gardens
		• To study different features of garden.
		• To study the different ornamental garden plants
		• To Know about Nursery Management.
USCEBO-612	**Analytical Techniques & Research Methodology**	**Unit-1 Tools & Techniques**
		• Students will be able to understand the important tools used in botanical science.
		• To know Principle, Structure and Uses of some basic tools used in botanical science.
		• To understand the advantages of tools and techniques in botany.
		Unit-2 Imaging Related Techniques

		• Students will be able to Know some imaging related microscopes.
		• To Know types of Microscopy, its principles and application.
		Unit-3 Chromatography
		• **After reading the unit students will be able** to understand the concept of chromatography.
		• To know about types of chromatography.
		• To know about application of chromatography.
		Unit-4 Biostatistics & Bioinformatics
		• **After reading this unit student will be able** to understand Biostatistics.
		• To know about Statistical Methods(collection of data, and analysis of data)
		• To know about Diagrammatic & Graphic presentation of Data.
		• To know aim and scopes of Bioinformatics.