

SYLLABUS BOTANY - CORE II

(CBCS 2014- Regular)



The Maharaja Sayajirao University of Baroda
Syllabus for B.Sc. 2014
Core II

FIRST YEAR

COURSE CODE

CREDITS

SEMESTER – I

| | | | |
|-----|------|---------------------|-----|
| BOT | 1104 | Plant Kingdom I | (2) |
| BOT | 1105 | Plant Kingdom I I | (3) |
| BOT | 1106 | Practical Botany –I | (3) |

SEMESTER – II

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|-----|------|------------------------------------|-----|
| BOT | 1204 | Angiosperm Morphology and Taxonomy | (2) |
| BOT | 1205 | Cell Biology | (3) |
| BOT | 1206 | Practical Botany – II | (3) |

SECOND YEAR

SEMESTER – III

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|-----|------|-----------------------------------------|-----|
| BOT | 1304 | Plant Anatomy | (2) |
| BOT | 1305 | Basic microbiology and Plant Physiology | (3) |
| BOT | 1306 | Practical Botany III | (3) |

SEMESTER – IV

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|-----|------|-----------------------------------|-----|
| BOT | 1404 | Plant Ecology and Instrumentation | (2) |
| BOT | 1405 | Economic Botany | (3) |
| BOT | 1406 | Practical Botany IV | (3) |

Total Credits (32)

DETAILED SYLLABUS FOR B.SC BOTANY CORE II

SEMESTER I

Course BOT – 1104 (2 Credits) Plant Kingdom I

Unit I Classification of Kingdoms and Bacteria: Criteria (according to Mayr, the seven kingdoms of living organisms); Introduction to different branches of botany (conventional and recent)

Bacteria (including Cyanobacteria): Group characters, Occurrence, morphological forms, ultrastructure and economic importance; Thallus organization and reproductive methods in the following types: *Nostoc*, *Pseudomonas*, *Rhizobium*, *Rivularia*, *Spirulina*

Unit II Algae: General characters, classification and economic importance, important features and life history of:

Chlorophyceae: *Volvox*, *Ulothrix*

Xanthophyceae: Diatoms

Phaeophyceae: *Sargassum*

Rhodophyceae: *Batrachospermum*

Suggested Reference Books:

1. Gangulee, S. C., Das, K.S, Dutta, C.D. and Kar, A.K. (1968) College Botany Vol. I
2. Smith, G. M. - (1972) Cryptogamic Botany Vol. I, McGraw-Hill
3. Vashishta, B.R. - (2008) Botany for Degree Students - Vol.I Algae.
4. Verma, J.P. - (1968) The Bacteria, Vikas Publications
5. Clifton, A. (1950) Introduction to Bacteria, McGraw - Hill

Course BOT – 1105 (3 Credits) Plant Kingdom II

Unit I Fungi: General characters, classification and economic importance; important features and life history of

Mastigomycotina: *Phytophthora*

Zygomycotina: *Mucor*

Ascomycotina : *Eurotium*

Basidiomycotina: *Puccinia*, *Agaricus*

A general account of lichens, morphological types and their examples

Unit II Bryophytes: Classification (Smith, 1955) and general study of morphology, anatomy and reproduction in:

Hepaticopsida: *Riccia*

Anthocerotopsida: *Anthoceros*

Bryopsida: *Funaria*

Pteridophytes: Classification (Smith, 1955), general study of morphology, anatomy and reproduction in:

Psilophyta: *Psilotum*

Lycophyta: *Selaginella*

Pterophyta: *Nephrolepis*

Unit III Gymnosperms: General features of gymnosperms, Classification (Sporne,) and economic importance; important features and life history of

Cycadopsida: *Cycas*

Coniferopsida: *Pinus*

Suggested Reference Books:

1. Gangulee, H. C, K. S. Das, C. Datta and Kar, A.K. (1968) College Botany Vol. II
2. Parihar, N.S. -(1956) Bryophyta
3. Parihar, N.S. -(1955) Pteridophyta
4. Smith, G.M. - (1972) Cryptogamic Botany Vol II
5. Vashishta, B.R. -(1962) Botany for Degree Students: Vol. II Fungi
6. Vashishta, B.R. - (2006) Botany for Degree Students: Vol. III Bryophyta.
7. Vashishta, P.C. (2006) Botany for Degree Students: Vol. IV Pteridophyta

Course BOT - 1106 Practical Botany I (3 credits)

The practical course will be based on the above theory units

SEMESTER II

Course BOT – 1204(2 Credits) Angiosperm Morphology and Taxonomy

Unit I Vegetative, Floral and Fruit morphology:

Root: Different regions and general functions, types of root systems

Stem: Various parts, normal functions (Different types of buds, vegetative and reproductive), forms of stem.

Leaf: Structure and normal functions. Simple and compound leaves

Seed: Definition, structure and types

Bracts, peduncle and inflorescence: Basic types and functions

Flower: Structure of a typical flower, definition and examples of different types of flowers. Introduction to the floral whorls

Fruits: Definitions of true, false and parthenocarpic fruits. Major types of fruits.

Unit II Angiosperms: Unique features of angiosperms and diversity; identification, nomenclature and classification (Bentham & Hooker's system); primitive and advanced features; the international code of botanical nomenclature.

Families: Major angiosperm families, detailed account of Malvaceae, Fabaceae, Solanaceae and Lamiaceae

Suggested Reference Books:

1. Gangulee, H.C., Das, K.S, Dutta, C.D. and Kar, A.K. (1968) College Botany Vol. III
2. Dutta A.C. - (1964) Botany for degree students.
3. Hickey M, King .C.(2002) The Cambridge Illustrated Glossary of Botanical Terms, Cambridge University press.
4. Sporne K.R. - (1968) The morphology of vascular plants.
5. Tyagi Y.D. & Kshetrapal S - (1973) An Introduction to Taxonomy of Angiosperms.
6. N.S. Subramanyam -(1968) Modern Plant Taxonomy
7. Sharma O.P - (1968) Plant Taxonomy
8. Pandey B.P. - (1968) Taxonomy of Angiosperms.
9. Vashishta P.C - (1968) Taxonomy of Angiosperms.
10. Daniel M. – (2009) Taxonomy – Evolution at work

Course BOT – 1205 (3 Credits) Cell Biology

Unit I Structural diversity of Plant cell:

Comparative account of cell in Animal and Plants (Bacteria, Mycoplasma, Algae, and Fungi)

Simple tissues: Living (collenchyma and parenchyma) and dead (sclerenchyma) cell types

Complex Tissues: Xylem and Phloem elements, structure and function

Cell wall: Layers, function, formation of cell wall

Intercellular communications: Plasmodesmata, pits - structure, types and functions

Unit II Cell Components I and Cell Division

Membranes: Different types of bio-membranes; their constituents and organization; different models

Endoplasmic Reticulum: Morphology, different types, structural and ultra structural features, origin and functions.

Structure and Functions of Nucleus: Ultra structure, nuclear membrane; nucleolus

Chromosome Organization: Morphology; centromere and telomere; sex chromosomes.

Mitosis & Meiosis: Different stages, chromosomal behavior, characteristic features and significance.

Unit III Cell Components II

Golgi complex: Morphology, structural and ultra structural peculiarities, different components; origin and functions

Lysosomes: Origin, different types; structural peculiarities, chemical constituents and functions.

Plastids: Pigments, different types; classification and morphology; ultra structure of chloroplast and chemical constituents

Mitochondria: Distribution, morphology, structural and ultra structural peculiarities, chemical composition and functions

Ribosome: Occurrence, types, differences in 70S and 80S ribosomes, structure, different constituents and functions.

Suggested Reference Books:

1. A Fahn - (1994) Plant Anatomy
2. C.P. Swanson - The cell.
3. W.A. Jensen - The plant cell.
4. C.B. Powar - (1977) Cell biology.
5. P.S. Verma and V.K. Agarwal - (1968) Cell biology, molecular biology, genetics and evolution.
6. G.B. Wilson and J.H. Morrison - (1968) Cytology
7. E.D.P. De Robertis and E.M.F. De Robertis - (1968) Cell & Molecular Biology.
8. P.K. Gupta - (1998) Cell Biology.
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Course BOT – 1203 Practical Botany II (3 credits)

The practical course will be based on the above theory units

SEMESTER III

Course BOT- 1304 (2 Credits) Plant Anatomy

Unit I Tissue systems:

Epidermal tissues : general organization, cuticle, trichomes and stomatal types

Secretory tissues : gum and resin ducts, laticifers, hydathodes, floral and extrafloral nectaries

Vascular tissue: Secondary xylem (basic structure of wood). Secondary phloem.

Secondary growth: Normal and anomalous secondary growth in different Angiosperms.

Periderm and lenticel - structure and development

Unit II Organisation of the higher plant body: The shoot and root systems; variation in habit and longevity; environmental influences

Meristems and development: Shoot apical meristem, root apical meristem, lateral meristems and their functions.

Nodal Anatomy: Leaf trace, leaf gap

Root stem transition

Suggested Reference Books:

1. H.C. Gangulee, K.S. Das A.K. Kar & D.C. Datta - (1968) College Botany, Vol. I & II.
2. A.C. Dutta - (1964) Botany for degree students.
3. K. Esau - (1961) Plant Anatomy.
4. A Fahn - (1968) Plant Anatomy.
5. B.P. Pandey - (1978) Plant Anatomy.
6. S.N. Pandey, S.P. Mishra and P.S. Trivedi –(1968) Textbook of Botany Vol.II.

Course BOT- 1305 (3 Credits) **Basic Microbiology and Plant Physiology**

Unit I Discovery of Microorganisms, Structure and classification of microbes, Systematic position of microorganisms in biological world; classification of microorganisms and characteristic features of different groups.

Methods in Microbiology: Basic principles of staining of Bacteria and Fungi, sterilization methods, culture media, pure culture methods, methods for population estimation, growth determination.

Unit II Ultra structure of Microorganisms: Prokaryotic microorganisms, fine structure of prokaryotic cell, Ultrastructure of fungal and algal cell., Viruses – properties and classification; bacteriophage T4 and TMV

Genetic recombination in Prokaryotes: Conjugation, transformation and transduction.

Industrial application of microorganisms: Alcohol, food processing, milk products, and antibiotics.

Unit III Plant Physiology

Water relations: Absorption of H₂O - mechanisms, ascent of sap, various theories.

Transpiration (Loss of H₂O) - types, mechanism, stomatal movements

Mineral nutrition: Criteria of essentiality of elements, essential elements (Major/minor), their role and deficiency symptoms.

Growth movements: Phototropism, Gravitropism and their reaction mechanism

Suggested Reference Books:

1. Verma, J.P (1992). - The Bacteria
2. Pelczar (1993) _ Introductory Microbiology
3. Clifton, A. (1958) Introduction to Bacteria
4. P.J. Kramer (1983) - Water relations in plants.
5. F.B. Salisbury & C.W. Ross - (1974) Plant Physiology.
6. L. Taiz & E. Zeiger – (2002) Plant Physiology

Course BOT- 1306 Practical Botany III (3 credits)

The practical course will be based on the above theory units

SEMESTER IV

Course BOT- 1404 (2 Credits) **Plant Ecology and Instrumentation**

Unit I Plant Ecology

Concept and structure of ecosystem, Food chain, food web, Ecological pyramids, Basic ideas about ecosystem functioning, energy flow, organic production, biogeochemical cycles and ecological instruments .

Ecological classifications of plants, Adaptations in hydrophytes, mesophytes, xerophytes, halophytes and epiphytes

Air, water and land pollution, causes and control measures

Unit II Instrumentation

Principle and working of pH meter, spectrophotometer, conductivity meter, turbidity meter and centrifuge

Biostatistics

Introduction , sampling methods in biological experiments and applications,

Methods of presentation of data: Tables, graphs, diagrams and frequency distribution.

Measures of central tendency – Mean median and mode for raw and grouped data

Suggested Reference Books:

1. P. D. Sharma – (1974) Ecology and Environment
2. J.E. Weaver & F.E. Clements - (1938) Plant ecology.
3. R.S. Ambasht - (1969) A text book of plant ecology.
4. M.A. Pallniswamy - (2002) Basic statistics for biologist.

Course BOT- 1405 (3 Credits) Economic Botany

Unit I

Domestication of Plants: Origin of cultivated plants, Vavilov's centre of origin, primary and secondary centers of diversity, plant introductions.

A general account of major food crops, cereals, pulses, vegetables, nuts and fruits. Their source, botanical name, family, morphological value and use.

Fodder legumes- a brief account.

Vegetable and essential oil sources: Mustard, Sesame, Groundnut, Cotton , Soybean and Coconut – a brief account.

Ethnobotany: Introduction, historical background .

The folklore of Gujarat - Major tribal groups and their distribution in different parts of Gujarat.

Use of plants and plant products by the ethnic groups for various purposes.

Unit II

Plant fibers: Cotton, jute and coir- A brief account and its uses.

Timber and firewood species: Identification and uses of five major species in Gujarat.

Medicinal Plants: A brief account of ten important plant drugs and their chief constituents used in indigenous / allopathic systems of medicine.

Natural rubber, insecticides and dyes: A concise account.

Ornamental Plants: Major ornamental plants (Trees, shrubs and herbs) in Gujarat.

Unit III

Horticulture: - Importance, Plant propagation through various methods – cutting, layering, grafting and budding.

Tissue Culture: Plant tissue culture, principles, types and technique

Phytoremediation: Bacterial, fungal and algal remediation

Remote sensing: its use in assessing vegetal cover

Suggested Reference Books:

1. A. Hill - (1972) Economic Botany.
2. P.L. Kochar -(1981) Economic Botany.
3. S.D. Sabnis and M. Daniel – (1990) A Phytochemical Approach to Economic Botany

Course BOT- 1406 Practical Botany IV (3 credits)

The practical course will be based on the above theory units