

SARAT CENTENARY COLLEGE

Department of Botany

B.Sc. Honours in Botany

Course Outcomes (CBCS)

SEMESTER-I

CC 1– Microbiology and Phycology:

1. The study of microorganisms is known as microbiology
2. The students know about the structure and character of viruses and bacteria
3. Beside these, they also acquire knowledge about the taxonomy of virus and bacteria
4. Economic importance of bacteria in various fields like agriculture and industry.
5. The students are also well acquainted with various practical experiments like sterilization techniques, media preparation and culture technique etc. of microorganisms
6. From phycology i.e. the study of algae, the students gained knowledge about the characters, structure, reproduction, life cycle etc. of algae
7. The students learn the vegetative and reproductive structures of different algae from the practical experiments.

CC 2-Archegoniate:

From the course curriculum of archegoniate the students learn:

1. about the general characters, structure, reproduction, life cycle etc. of Bryophytes, Pteridophytes and Gymnosperms
2. morphological diversities of Bryophytes and Pteridophytes
3. about the economic importance of Bryophytes, Pteridophytes and Gymnosperms in various fields
4. the different genera of Bryophytes, Pteridophytes and Gymnosperms
5. to identify different Bryophytes, Pteridophytes, and Gymnosperms based on their practical knowledge.

SEMESTER-II

CC 3- Mycology and Phytopathology:

1. The students gained knowledge about the general characters, structure, reproduction, life cycle etc. of different fungi
2. About the economic importance of fungi
3. Studies of Mycorrhiza will help to gain knowledge about green farming.
4. Identifying different genera of fungi from practical classes
3. Students also learn to identify diseases in plants and gained knowledge about plant pathology
4. Application of fungi in biotechnology is also studied

CC 4-Morphology and Plant Anatomy of Angiosperm:

On completion of this course, the students are able to:

1. Know the concept on the structure, function and morphological diversity of different vegetative and reproductive plant parts like leaves, inflorescence, flower, fruit and seeds.
2. Learn the scope and importance of these fields
3. Be acquainted with the structural development of plant body.
4. Take knowledge on the theories of apical meristem.
5. Understand the sporogenesis and gametogenesis
6. To gain practical knowledge on different morphological and anatomical parts of the plants

SEMESTER-III

CC 5 -Plant Ecology and Phytogeography

From this course, the students may understand -

1. The concept of living world and the environment
2. The origin, composition and structure of the soil
3. The dynamics and characteristics of population.
4. The trophic organization, food chain, food web

CC 6 -Plant Systematics:

The course provides information about:

1. The scope and importance of the field
2. The contributions of taxonomists in this field.
3. Nomenclature, identification and classification
4. Know about the computer-based Literature.
5. Knowledge about Numerical Taxonomy, Cytotaxonomy etc.
6. Nomenclatural codes
7. Idea about the phylogeny of angiosperms.
8. To identify unknown plant specimens based on their practical knowledge

CC 7 – Economic Botany:

1. The origin and distribution of plants are known from this course
2. Ideas about the economically important plants are also established
3. Student are able to identify the active ingredients of cereals, legumes, sugars yielding plants, spices etc. by various microchemical tests.

SEC 1 – Agricultural Botany

1. Agricultural Botany is a two-credit skill enhancement course designed to receive a detail insight of important physiological mechanism, biochemical pathways, and various breeding methods of plants.
2. The students know the green manures involving Cyanobacteria and Mycorrhiza
3. They will gain the concept of genetically modified plants along with its applications

SEMESTER-IV

CC 8 - Palaeobotany & Palynology:

From this curriculum, the students are able to:

1. Know the scope and importance of palaeobotany, types of fossils, its preservations, fossilization process and geological time scale.
2. Understand the different fossil genera representing different fossil groups
3. Practical knowledge on various fossilized genera and pollen morphology

CC 9 -Biomolecules and Cell Biology:

On completion of this course on Biomolecules and Cell Biology, students are able to gain knowledge on:

1. The structures and properties of water
2. Structure of carbohydrates, proteins and lipids
3. The Structures of amino acids and its biological roles in plants.
4. The structures of DNA and RNA, Forms of DNA, Types of RNA and their roles
5. Laws of thermodynamics and structure of ATP and its role as a energy currency molecule
6. The cell wall and plasma membrane along with transport system
7. Ultra structures and functions of various cell organelles like Nucleus, cytoplasm, chloroplast, peroxisomes, endomembrane systems
8. Cell cycle and mitotic and meiotic cell divisions along with regulations
9. Practical knowledge on biochemical tests, membrane permeability, stomatal index, plasmolysis, cell divisions etc.

CC 10 - Molecular Biology:

From Molecular Biology course, students are able to understand

1. The genomic organization
2. Study of genes, genome, chromosome etc.
3. The mechanism of DNA replication, transcription, post transcriptional modifications, genetic code and translation, the concept of operon and its structure and regulations
4. The fundamentals of Recombinant DNA Technology
5. The principles and basic protocols for Plant Tissue Culture and its applications

SEC 2- Biofertilizer:

1. Students are able to understand and differentiate between chemical and biofertilizer along with the advantage and disadvantage,
2. Biofertilizer and its importance for soil health and nourishment
3. They are able to know the harmful effects of chemical fertilizers and how to reduce production costs and environmental impact associated with chemical fertilizers by increasing awareness of using biofertilizer in agriculture.

SEMESTER-V

CC 11-Plant physiology:

The course on plant physiology contains basic information on physiological processes and related biochemical pathways in plants. The knowledge acquired by the students are as follows;

1. Water uptake and water balance in plants
2. Nutrients and minerals absorption along with their importance.
3. Basics of phloem transport
4. Hormones and their significance in plant growth
5. Impact of light and its periodicity in flowering
6. Practical experiments on various physiological processes

CC 12 -Plant Metabolism:

The course on plant metabolism gives ideas about:

1. The anabolic and catabolic pathways; regulation of metabolism, isoenzymes, allosteric inhibitions covalent modulation etc
2. The synthesis and catabolism of sucrose and starch
3. Photosynthetic pigments, antenna molecules and reaction centres, photosynthetic electron transport; PSI, PSII, Q cycle, CO₂ reduction, photorespiration, crassulacean acid metabolism and factors affecting CO₂ reduction.
4. Glycolysis and fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration
5. Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic, ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf s experiment, role of uncouplers.
6. Lipid metabolis, beta oxidation, gluconeogenesis and its role, significance of lipids
7. Nitrate assimilation, biological nitrogen fixation, physiology and biochemistry of nitrogen fixation, ammonia assimilation and transamination
8. Cell signalling, receptor-ligand interactions, second messenger concept, calcium calmodulin, MAP kinase cascade
9. Practical knowledge in metaboloism

DSE 1- Reproductive Biology of Angiosperms:

1. The reproductive biology is designed to understand the biological principles to govern the reproduction in plants
2. The flower and its structure related functions, pollen biology, pollination, fertilization, seed formation, and separation process of viable and nonviable pollen by Tetrazolium test

DSE 2- Biostatistics

1. Biostatistics basically statistical methods used in biology
2. In Biostatistics, students learn about data, collection of data, types of data, sampling
3. The students also learn about measures of central tendency - mean, median and mode
4. The students gather knowledge on correlation and regression, chi square test
5. Practical knowledge on mean, median, mode, standard deviation, standard error, correlation etc.

SEMESTER-VI

CC 13 - Genetics & Plant Breeding:

On completion of the course, the students are able to understand:

1. Mendelian and Neo- mendelian genetics
2. The law of segregation, independent assortment
3. The phenomenon of linkage and crossing over
4. Mutation, types and its detection, mutagens and its types, molecular basis of mutation
5. The classical as well as molecular concepts of gene.
6. Plant Breeding and its role
7. Various methods of crop improvement associated with plant breeding along with its merits and demerits
8. Knowledge of heterosis and inbreeding

CC 14- Plant Biotechnology:

This course introduces the current advancement in the applied fields of life sciences including plant biotechnology, genetic engineering, and another research-oriented processes. The course used to highlight the students to flourish their career in research and development. They will excel their knowledge in the following areas:

1. Plant tissue culture techniques
2. Recombinant DNA technology

3. Construction of vector for gene cloning
4. Gene cloning and development of genetically modified plants by direct or indirect methods
5. Polymerase chain reaction
6. Application of biotechnology for human welfare
7. Practical knowledge on tissue culture and other processes

DSE-3 Plant Evolution and Biodiversity

The students gained knowledge about :

1. Earliest forms of plant life, evolution of eukaryotes.
2. Evolutionary trends- green algae to land plants, non-vascular to vascular plants
3. Phylogeny of plants
4. Evolutionary theories - Natural Selection, Group Selection, Neutral theory of molecular evolution.
5. Plant diversity around the world
6. Practical knowledge on vegetative and reproductive structures of various plants

DSE 4 – Horticulture and Post harvest Technology

1. Scope and importance, Branches of horticulture and its role
2. Ornamental plants
3. Fruit and vegetable crops
4. Horticultural techniques
5. Landscaping and garden design
6. Floriculture
7. Disease control and management
8. Post-harvest technology
9. Horticultural crops
10. Field visits to gardens, standing crop sites, nurseries, vegetable gardens and horticultural fields along with reports

Programme Outcome

- Botany is the branch science which deals with the study of plants
- Besides to give us oxygen, plants are also having with immense importance to humans and other forms of life to serve the sources of food, shelter, cloth, medicine etc.
- There are great scopes to develop the career after the completion of degrees with Botany as subject
- After graduation, one can either opt for job in teaching or other sectors or can enroll them for higher studies to complete M.Sc. and PhD in Botany or allied fields or other postgraduate diplomas and MBA courses etc.
- They can opt for various government and non-government jobs including Teaching, Scientist for Research and Development or as technical person
- The qualified persons are engaged as Plant Taxonomist, Microbiologist, Cytologist, Molecular Biologist, Ecologist, Horticulturist, Geneticists, Plant Breeder, Environmental Consultant, Forester, Biotechnologist, Plant Pathologist, Curator of Botanical Garden etc.
- Other important fields are the Botanical Survey of India, various Agricultural Research Stations, Institutes of Plant Sciences etc.
- Various departments and agencies recruit botanists to conduct research for crop production, to develop plant varieties, to manage and conserve the natural resources and to promote sustainable development
- The industries which are important to develop career in botany includes agricultural industries, phytochemical industries, food and beverage industries, drug industries, biotechnology industries, environmental organizations like World Wildlife Fund etc.
- The biotechnology industries recruited botanists to work on plant or microbial or environmental biotechnology, genetic engineering etc.
- The pharmaceutical industries engage the botanists to carry out research and development on medicines and natural products
- The research plays an important role in developing biofuels to utilize renewable energy. Advances in research with plant biotechnology are going on for sustainable development
- To conclude, botany is a vital field of science which plays an important role in modern era including improving agriculture, medicines and to protect the environment