

Program Outcomes, Program Specific Outcomes, Course specific Outcomes

Academic year 2020-2021

Department of Botany

Program Outcome: B.Sc. (Botany)	
After successful completion of three-year degree program in Botany, a student will be able to;	
➤	Compete in different types of science related branches and examinations
➤	Seeks admission to M.Sc. Botany, Biotechnology and other branches of Life sciences
➤	Enter in any research field of life science after completion of PG to find out new solutions to biology related issues.
➤	Solve the problem and also think methodically, independently and draw a logical conclusion.
➤	Employ critical thinking and the scientific knowledge to design, carry Out, record and analyze the results of biological (botanical) concepts.
➤	to think practically on various environmental issues like pollution, global warming, soil erosion etc. and act accordingly.
➤	To inculcate the scientific temperament in the students and outside The scientific community.
➤	Use modern techniques, decent equipment's and biological software's
➤	Find out biological solutions to revolutionize agriculture and crop improvement
➤	To implement Integrated pest management effectively
➤	Take care of environment, agriculture and society with his knowledge
➤	Appear for competitive examinations and defend interviews

Program Specific Outcome: B.Sc. (Botany)

➤	Student can get knowledge of plant world and can apply it in his daily life
➤	He is able to identify and classify any plant with his medicinal properties and basic chemical constituents.
➤	He is able to get job in agriculture, forest and any other sectors.
➤	He will become expert in operating various basic and advanced equipment's and chemical solutions for the basic experiments.
➤	He can compete any subject related competitive examinations like forest department.
➤	Understand good laboratory practices and safety.
➤	Develop research-oriented skills.
➤	Gets appropriate knowledge of environment and regarding solutions of various environmental issues by biological way.
➤	Act and aware people for environmental pollutions and other issues.
➤	With his knowledge he can effectively run the afforestation programme in the society.

Course Outcomes of B.Sc. (Botany)

Class	Course title & Code	Course Outcome
Semester- I		
F.Y.B. Sc.	BO-111: Plant Life and Utilization	<ul style="list-style-type: none"> Students may get knowledge of world of lower plants. An understanding of morphology, anatomy, reproduction methods, systematic position can be acquired by students. Economic and medicinal importance of different cryptogams like. Algae, fungi, lichens and bryophyte's may be known by the students. The utilization of different types of lower plants for the welfare of man can be understood by the students. Students can make small projects on collection, identification and enumeration of different types of algae, fungi, lichens and bryophytes occurring in the local area.
F.Y.B.Sc.	BO-112: Plant morphology and Anatomy	<ul style="list-style-type: none"> Students will be well acquainted with morphology and different terms used for the study of morphology of plants They can also study plant identification, nomenclature systems and classification of plants.

		<ul style="list-style-type: none"> • Students will get knowledge of different anatomical terms and different tissue system • They will be well acquainted with the morphological and anatomical differences of monocot and dicot plants.
F.Y.B.Sc.	BO-113: Botany Practical Course I	<ul style="list-style-type: none"> • Actual practical of lower plants like algae, fungi, bryophytes and lichens gives student the better understanding of lower plants. • They may also get familiar with different morphological terms with direct practical experience by handling different plants. • They may know diversity of flowers and fruits in Angiospermic plants and get knowledge to identify the plant. • By practicing taking sections of various plant parts, students may become familiar with anatomical studies and get skills of sectioning and staining of different plant parts.
Semester- II		
F.Y.B.Sc.	BO-121: Plant Life and Utilization-II	<ul style="list-style-type: none"> • Students will get an idea of vascular plants • They may know the morphology, reproduction and systematic position of different pteridophytes like <i>Nephrolepis</i>. • Economic and medicinal importance and utilization of different Pteridophytes can be learnt by the students. • Students will definitely learn difference between phanerogamas and cryptogams, i.e., higher plants and lower plants. • The morphology, anatomy and reproductive organs of gymnosperms like Cycas can be better understood by students with their economic importance. • Students will be well acquainted with the different systems of classification of higher plants. • The economic importance and utilization of different food, fodder, fiber and medicinal plant can be better understood by students. •
F.Y.B.Sc.	BO: Principles of Plant Science	<ul style="list-style-type: none"> • Important physiological phenomenon like diffusion, osmosis, plasmolysis, plant growth etc. can be learnt by the students. • The role of all these physiological process in plant life can be better understood by the students. • The students will be better familiar with basics of plant cells and also get knowledge of various cell organelles. • They may become familiar with the cell cycle and different stages of mitosis and meiosis. • Advanced knowledge of molecular biology can be

		<p>acquired by students.</p> <ul style="list-style-type: none"> • They may also know the structure of DNA and nucleotides and also learn popular theory of DNA proposed by Watson and Crick. • They will know different types of DNA. Chromosomes etc. • Students will get thorough knowledge of DNA replication and enzymes involved in it which will be applicable for the for the better understanding of important concepts of molecular biology and molecular basis of inheritance.
F.Y.B.Sc.	BO-123: Botany Practical –II	<ul style="list-style-type: none"> • In this practical student can handle the plants like <i>Nephrolepis</i> for the better understanding of these plants. • Also, they will be well acquainted with the gymnosperms by handling specimens of Cycas. • Students can easily make comparison between Dicot and monocot plants. • They will practically study importance of angiospermic plants which includes, food, fodder, fiber, medicine etc. • Students with a study tour van better he knows about plant diversity in the local area. • Students will be well acquainted with mitosis and meiosis processes by using various plant parts. • They can understand the concepts of plasmolysis, osmosis and DPD by direct practical's.
Semester- III		
S.Y.B.Sc.	BO-231: Taxonomy of Angiosperms and Plant Ecology	<ul style="list-style-type: none"> • In this course students will get basic knowledge of plant taxonomy. • They can be acquainted with the different systems of classification, Rules of plant nomenclature and Identification. • Student may learn basic knowledge of plant identification. • Students are well acquainted with some basic terms like typification, binomial nomenclature etc. • Students will study some representative families in detail. • In other half of course students are getting knowledge of some basic phenomenon of ecology • Different plants and ecological grouping will also be studied by the students.
S.Y.B.Sc.	BO-232: Plant Physiology	<ul style="list-style-type: none"> • Students will be familiar with many physiological phenomenon like Water absorption, ascent of sap, transpiration, nitrogen metabolism, seed dormancy and germination and physiology of flowering. • Students may get answers of the questions in their mind about the metabolic activities of the plants.

		<ul style="list-style-type: none"> • Students will get an idea of various phenomenon of flowering, how plants absorb water from soil and provide it to upper plant parts. • They may get knowledge of seed dormancy and germination. • Students may be well acquainted with basic phenomenon of nitrogen fixation and microorganisms associated with it.
S.Y.B.Sc.	BO-233: Practical Botany-III	<ul style="list-style-type: none"> • In this practical course, students will have hands on training on • Identification of plant families • Description of flowering plants • Study of different types of taxonomic and ecological instruments. • Different physiological processes like, DPD, Leaf protein isolation, transpiration etc. • Some ecological field work practicals also carried out by students including seed germination percentage, study of vegetation by list count quadrat method etc. • Students will also experience the field trips, excursion visits arranged by department.
Semester- IV		
S.Y.B.Sc.	BO-241: Plant Anatomy and Embryology	<ul style="list-style-type: none"> • In this basic theory course, students will be familiar to • Basics of plant anatomy • Plant embryology • Different types of tissue systems which includes, epidermal, mechanical and other. • Students may learn how secondary normal and abnormal growth takes place in dicot and monocot plants. • In the second half of this course, students will get an idea of plant embryology. • They may learn in details about the concepts of microsporangium and mega sporangium with their stepwise development. • . Students will get knowledge of pollination and its various types. • They may also get familiar with the fertilization and formation of endosperm and embryo. •

S.Y.B.Sc.	BO-242: Plant Biotechnology	<ul style="list-style-type: none"> • In this advanced subject, students will get an idea of plant biotechnology and its importance. • Students will learn in detail about emerging branch which is known as Plant tissue culture. • They also get knowledge of single cell proteins and their application. • Plant genetic engineering and its different techniques may be learned by the students with different types of enzymes associated with. • Students also will learn the concepts of genomics, proteomics and bioinformatics. • A new and emerging field, bioremediation is included in the syllabus which can be utilized by the students for pollution control. • Biofuel is an emerging technology and it is need of time. Students by studying the concept of biofuel may be well acquainted with the techniques and significance of biofuel over fossil fuels.
S.Y.B.Sc.	BO-243: Practical Botany-IV	<ul style="list-style-type: none"> • In this, practical paper, students will practice hands on training on sectioning for the better understanding of concepts like different types of tissue system, including epidermal, meristamatic, vascular etc. • Students may get practical knowledge of staining. • In the biotechnology section, they may learn practical's of tissue culture, media preparation, stant preparation, sterilization etc. • Students may practice laboratory cultivation of Spirulina. • They will have demonstration of some practical like gel electrophoresis, transgenic crops, tissue culture etc. • Students will visit any tissue culture laboratory for the better understanding of different steps. • By better understandings of the cultivation techniques of spirullina, students may start their own business.
Semester-V		
T.Y.B.Sc.	BO-331: Cryptogamic Botany	<ul style="list-style-type: none"> • This course is important for the better understanding of the basic botany. • Algae, fungi, bryophytes and pteridophytes will be better understood by the students in here. • General characteristic features of different cryptogamic plants including algae, fungi, bryophytes and pteridophytes can be better understood by the students. • Nutrition, taxonomic positions, and reproduction of different cryptogams will be better understood by the students. • Morphological and anatomical characteristics of different cryptogams will be better understood by the students.

		<ul style="list-style-type: none"> • Classification of different cryptogamic plants can be studied by students.
T.Y.B.Sc.	BO-332: Cell and Molecular Biology	<ul style="list-style-type: none"> • Cell is basic fundamental unit of life. How it is can be learnt by students in this paper. • Introduction to cell and cell biology with its brief history will be learned by the students. • Students will be familiar with cell and different types of cell organelles. • Cell organelles like, cell wall, plasma membrane, Endoplasmic reticulum, mitochondria, chloroplast etc can be learn by the students with their morphology, chemical constituents and functions. • It is very important for the better understanding of prokaryotic and eukaryotic cells. • In the second half of this course students are able to learn various phenomenon of molecular biology which includes central dogma, transcription, translation, DNA replication, damage and repair, genetic code etc. • Students may also get familiar with different gene actions and regulations.
T.Y.B.Sc.	BO-333: Genetics and Evolution	<ul style="list-style-type: none"> • In this course students can learn concepts of two different mechanisms i.e., Genetics and Evolution. • In the first half, students may learn basics of genetics, Mendelism and his laws and different crosses. • They will also learn concepts like gene interaction, multiple alleles, linkage and crossing over, quantitative and cytoplasmic inheritance, sex linked inheritance, euploidy and aneuploidy with suitable examples. • Students also will get an idea of chromosomal aberrations. • In the second half, students may get an idea of different theories of evolution, evidences of evolution, population genetics etc. • This study is very important to find answers to different problems related to plant and animal genetics.
T.Y.B.Sc.	BO-334: Spermatophyta and Palaeobotany	<ul style="list-style-type: none"> • Phanerogams are the higher plants which includes gymnosperms and angiosperms. • Through this course, students will learn the different types of classifications systems associated with gymnosperms and angiosperms. • In gymnosperms students are able to learn distribution, morphology, anatomy, reproduction, gametophyte and sporophyte of the plants <i>Pinus</i> and <i>Gnetum</i>. • In angiosperms they are able to understand their origin and different plant families with their systematic position, distinguishing feature, economic importance etc. • Students will also understand different concepts of

		<p>plant identification and authentication.</p> <ul style="list-style-type: none"> • In the last chapter of course, students will learn about palaeobotany and fossils with different type of fossil groups. • This course is very important for students to differentiate angiosperms and gymnosperms and also to describe and identify different plants.
T.Y.B.Sc.	BO-335: Horticulture and Floriculture	<ul style="list-style-type: none"> • This is applied paper in which students will get theoretical as well as practical knowledge of horticulture and floriculture. • Students will get knowledge of different horticultural plants and methods of plant propagation. • Students will also learn special practices in horticulture like bahar treatment, girdling, notching, bending etc. • Students will also get well acquainted with fruits and vegetable production technology applicable for different types of fruits like banana and mango. • This is also applicable for the ornamental plant production. • In this course students will get theoretical and practical knowledge of cultivation and marketing some important flowers like, Aster, Orchids , <i>Tagetes</i> etc. • Also, they will become well acquainted with some processing and preservation practices of flowers.
T.Y.B.Sc.	BO-336: Computational Botany	<ul style="list-style-type: none"> • This course deals with the analytical studies related with plants. • In this biostatistical phenomenon like, population, sample, qualitative and quantitative data etc. will be learnt by students. • Sample and sampling, • Collection and representation of data, measures of dispersion, correlation and regression, probability, tests of significance and data analysis will be learnt by the students. • Knowledge of this course would be very beneficial for students for the analytical data related with plants.
Semester-IV		
T.Y.B.Sc.	BO- 341: Plant Physiology and Biochemistry	<ul style="list-style-type: none"> • In the first half of this course, the concepts like photosynthesis, respiration, translocation of solutes, stress physiology will be studied in detail. • Different physiological phenomenon like photophosphorylation, HSK pathways, C4 pathways, Glycolysis, ETS, etc. can be studied by students in detail. • In the second half of course, details of carbohydrates, amino acids and proteins, lipids are studied in detail.

		<ul style="list-style-type: none"> • The enzymology part of this course is also very important to understand different mechanisms associated with enzymes. • Secondary metabolites are the important byproducts of plant metabolism which would be studied by the students with their importance and metabolism.
T.Y.B.Sc.	BO-342: Plant Ecology and Biodiversity	<ul style="list-style-type: none"> • This course is divided into two different parts, 1. Ecology and 2. Biodiversity • In the ecology section, students may learn about, different types of pollutions with the causes, effects and control measures. • The mechanisms like eutrophication, bioaccumulation, biomagnification is learnt by the students in detail. • Students will also get knowledge of desertification, ozone depletion and global warming, Environmental Impact Assessment, Ecology and Economics, Remote sensing. • In the biodiversity section, students get an idea of biodiversity, types of biodiversity, concept of endemism and phytogeography. • It is also related with loss of species and genetic diversity. • In last section, the students will get an idea of in-situ and ex-situ conservation with their examples. • Students also get acquainted with social approach of biodiversity conservation.
T.Y.B.Sc.	BO-343: Plant Pathology	<ul style="list-style-type: none"> • In this course students will get knowledge of some important terms of plant pathology, incitants, host etc. • Also, students will also get knowledge of the mechanism of disease development, defense mechanism etc. • Students also learn the methods of studying plant diseases. • The students can get knowledge of different fungal, bacterial, mycoplasma, nematodal, viral diseases with causal organisms, symptoms and control measures. • Some non-parasitic plants diseases are also included under the syllabus which are also beneficial for students to get better knowledge of plant diseases. • Students will also learn about principles of plant disease control and molecular diagnostic features and transgenic in crop protection. • By the knowledge of this course students will get basic knowledge of local crop diseases.

<p>T.Y.B.Sc.</p>	<p>BO-344: Medicinal and Economic Botany</p>	<ul style="list-style-type: none"> • This course deals with the study of medicinal plants and their applications for different purposes. • Students will get knowledge of pharmacognosy and classification of various crude drugs. • Students also will get basic knowledge of Ayurveda which includes, concept of tridosha, Indigenous systems of medicine, Ayrvedic principles, formulations like Asava, Arishtha, churna etc. • In the analytical medicinal botany, students would get knowledge of drug adulteration, methods of extraction, drug evaluation etc. • Students also get knowledge of cultivation, processing and marketing of different herbal drugs. • Also, students will become well acquainted with the term ethnobotany with its introduction and basics. • Economic botany deals with the study of different economically important plants like, rice, turmeric, safflower, palas etc. • This course is very important for students for basic understandings of some crude drugs.
<p>T.Y.B.Sc.</p>	<p>BO-345: Plant Biotechnology</p>	<ul style="list-style-type: none"> • This is advanced course of botany in which some biotechnological principles will be learnt by students. • In the plant tissue culture section, students are able to study techniques, and applications of callus, cell suspension, protoplast, and embryo culture. Apart from this, students may get knowledge of some concepts like somatic hybridization, micropropagation, embryo rescue etc. • Students will also become familiar with the concept of germplasm and cryopreservation. • Also, they will better know with the concept of plant as bioreactors. • Student also know in detail the mechanism of symbiotic as well as asymbiotic nitrogen fixation by some nodule forming and free-living bacteria. • Student by taking this course will better understand concept of biofertilizers with its types. • Students will also become well acquainted with the different databases and their applications coming under the term bioinformatics. • Students will also get a knowledge of genomics and proteomics with their concept and applications.
<p>T.Y.B.Sc.</p>	<p>BO-346: Plant Breeding and Seed Technology</p>	<ul style="list-style-type: none"> • This course deals with two branches 1. Plant breeding and 2. Seed technology. • In the first half of this course, students will learn basics of plant breeding, plant introduction and

		<p>acclimatization.</p> <ul style="list-style-type: none"> • Also, students will learn about different selection methods like mass, pure line and clonal selection. • Also, students will learn about different concepts of hybridization, breeding methodology, heterosis and hybrid vigour, mutation breeding. • Students may know the different types of mutagens like chemical and physical to carryout mutation breeding. • Students also get an idea of polyploidy and aneuploidy in crop improvement. • Also, students become acquainted with breeding for stress tolerance. • Seed technology is another section of this course in which students would learn about different types of seeds. • Students also get knowledge about different concepts of seed technology including, seed certification, seed processing, seed sampling, storage and packaging, testing and marketing.
<p>T.Y.B.Sc.</p>	<p>BO-347: Botany Practical-I</p>	<ul style="list-style-type: none"> • This practical is based on four theory courses from which students will get hands on practice of some important practicals. • It includes practicals based on cryptogams like, algae, fungi, bryophytes and pteridophytes. • Morphology, anatomy and reproductive structures of different types of cryptogams would be better studied by the students. • Also, students will get an idea of preparation of different stains. • Also, they will actually observe different stages of mitosis and meiosis. • Students will also learn to study chromosome morphology and DNA and RNA extraction techniques. • Students will also learn to estimate chlorophyll a and b by using paper chromatography and TLC. • Students also practically estimate amino acids and proteins by different methods. • Students will learn to prepare MS medium. • Also, students will study different types of biofertilizers including algal, fungal and bacterial.

		<ul style="list-style-type: none"> • Also, student will able to estimate Nitrate Reductase enzyme from legume nodules. • Students will also practically study about transgenic plants like Bt Cotton, Bt Tomato, Golden rice etc.
T.Y.B.Sc.	BO-348: Botany Practical-II	<ul style="list-style-type: none"> • Students are able to study structural heterozygotes in <i>Rhoeo</i> plant to study multiple translocations. • Also, practically students will observe salivary gland chromosome of Chironomous larvae. • By some calculations student will become expert to solve genetic problems based on PTC taste sensitivity, Earlobe and rolling of tongue and three-point test cross. • Practically study of morphology and anatomy of <i>Pinus</i> and <i>Gnetum</i> would made students expert in the subject gymnosperms and also in staining and sectioning. • Also, they may become expert in description and identification of living plants as well as fossils. • With proper knowledge of plant taxonomy, students will be preparing artificial keys. • Different studies of polluted water including BOD, turbidity, conductivity also practically observed by the students. • Also, student will visit nearby locality to study biodiversity. • Students will become well acquainted with different hybridization techniques. • Student may artificially induce polyploidy in different plants like onion. • Students can perform different seed testing by instruments like hot air oven.
T.Y.B.Sc.	BO- 349: Botany practical- III	<ul style="list-style-type: none"> • In these practical students will become expert on • Understanding phenology of fruits, vegetables and flowering crops. • Will get know about different types of garden tools like sprayer, duster etc. • Will learn techniques of cutting, budding, layering and grafting. • Learn technique of making dry flowers

		<ul style="list-style-type: none">• Also, student will learn about many other horticultural techniques.• Students will learn to calculate different types of statistical problems like mean, mode, median, standard deviation and other types of statistical problems.• Also, students will practically learn to prepare culture media, culture techniques.• Students will learn about different fungal, bacterial and mycoplasma diseases.• Students will practically observe and study different herbal drugs.• Also, they will learn prepare different ayurvedic formulations like Asav, Arishtha, Churna etc.• Students will learn to extract different phytochemicals from the medicinal plants.
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