

Msc Botany

<p>M.Sc. Sem. I Course PSBO101</p>	<ul style="list-style-type: none"> ✓ Learner will gain knowledge of Algae classification according to G.M.Smith. ✓ It helps to understand modern techniques of Algal culture and biofuel producing Algae. ✓ The learners will get understanding of fungal classification according to Alexopoulos and there spore bearing organs ✓ Learners will get applied knowledge of fungi in agriculture, forest and there different pathological aspects.
<p>M.Sc. Sem. I Course PSBO102</p>	<ul style="list-style-type: none"> ✓ Helps to understand classification of gymnosperms upto orders according to the system proposed by C. J. Chamberlain and to know General characters; affinities and interrelationships of Cycadofilicales, Bennettitales and Cordaitales.
	<ul style="list-style-type: none"> ✓ Learners get knowledge of Origin and evolution of angiosperms; the primitive angiospermic flower; primitive and advanced character in angiosperms. ✓ Help to get hand on International Code of Botanical Nomenclature (I.C.B.N.) History and basic Principles and Principles for assessment of relationships, delimitation of taxa and attribution of rank. ✓ To understand Evolution, variation and speciation, Biosystematic categories, Biotypes and Ecotypes. different Concept of type function values of taxonomic characters like numerical taxonomy, chemotaxonomy, Molecular systematics.

M.Sc. Sem. I Course PSBO103	<ul style="list-style-type: none"> ✓ To understand different photosynthesis in plants such as Regulation of C3, C4 and CAM pathways of photosynthesis: Role of light in the activation of dark phase enzymes, regulation of RUBISCO, PEPcase, light effect, modulators and coordination of light , dark phase. C4 Photosynthesis: inter and intra-cellular transport of metabolites, carbonic anhydrase, PEPcase, NADP-MDH and PPDK. Regulation of CAM through transport of metabolites. 2. Pentose Phosphate Pathway and its importance. ✓ To get hand on Photosynthesis of prokaryotes: Pigment systems in bacteria and Cyanobacteria, light harvesting mechanisms, reductive TCA cycle. ✓ Learners will understand Proteins: Primary, secondary, tertiary and quaternary structural features and their analysis – Theoretical and experimental; protein folding – biophysical and cellular aspects. ✓ Learners get proper knowledge of Plant hormones: Biosynthesis, storage, breakdown and transport
M.Sc. Sem. I Course PSBO104	<ul style="list-style-type: none"> ✓ To understand Cell division and cell cycle: Steps in cell cycle and control of cell cycle. ✓ Learners will get understanding of Molecular basis of transformation, transduction, Conjugation; fine structure of the gene, T4 Phage, complementation analysis, deletion mapping, cis-trans tests. ✓ New techniques of Recombinant DNA Technology Vectors in gene cloning: pUC19, phage, cosmid, BAC and YAC vectors. High and low copy number

	<p>plasmids and its regulation.</p> <ul style="list-style-type: none"> ✓ Proper knowledge of Applications of Recombinant DNA technology Application of recombinant DNA technology for production of herbicide resistant plants, insect resistant plants, improving seed storage proteins and golden rice.
M.Sc. Sem. II Course PSBO201	<ul style="list-style-type: none"> ✓ Lerner will understand Classification of Bryophyta, upto orders, according to the system proposed by G.M.Smith, Alternation of generation in Bryophyta. ✓ Origin and evolution of Bryophyta with reference to habitat and form, evolution of the Sporophyte in Bryophyta ✓ To understand different Classification of Pteridophyta, upto orders, according to the system proposed by G.M.Smith. The geological time scale and a study of fossil Pteridophytes (Rhinea, Horneophyton, Lepidodendron, Calamites, Cladoxylon, Sphenophyllales, Coenopteridales) and economic importance of Pteridophytes; cultivation and maintenance of ornamental Ferns.
M.Sc. Sem. II Course PSBO202	<ul style="list-style-type: none"> ✓ Learners will understand Anatomy of Meristems, Definition type of meristems, apical cell theory, histogen theory and Tunica corpus theory and Sensory and tactile tissue system: Tactile sense organs, gravitational and optical sense organs. ✓ To understand Morphogenesis and organogenesis in plants, Organization of shoot and root apical meristems; shoot and root development, leaf development and phyllotaxy; transition of flowering, floral meristems and floral development in Arabidopsis and Antirrhinum. ✓ Learners will understand Male gametophyte: Pollen development and gene expression male sterility sperm dimorphism and hybrid seed production; pollen tube growth and guidance; pollen storage; pollen embryos. Female gametophyte; Types of embryo sacs; structure of embryo sac cells. ✓ To understand Pollination, pollen-pistil interaction and fertilization: floral characteristics. Mechanism of Pollination and Fertilization: vectors involved in pollination; breeding system; commercial

	<p>considerations, structure of the pistil; pollen-stigma interactions, sporophytic and gametophytic self-incompatibility (cytological, biochemical and molecular aspects); double fertilization; in vitro fertilization.</p> <ul style="list-style-type: none"> ✓ Learners will understand Seed development and fruit growth; endosperm development during Early, Maturation and Desiccation stages; embryogenesis, ultrastructure and nuclear cytology; cell lineage during late embryo development; storage proteins of endosperm and embryo; apomixis; embryo culture; dynamics of fruit growth; biochemistry and molecular biology of fruit maturation. ✓ Learners will have knowledge of Special relationships of pollen grain in pollen tetrads and Pollen wall morphogenesis, ultrastructure, primexin formation, Pollen proteins and allergen.
M.Sc. Sem. II Course PSBO203	<ul style="list-style-type: none"> ✓ Learners will have knowledge of Physiology and biochemistry of seed germination mobilization of food reserves, germination and growth factors, seed dormancy, control and release of dormancy. Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanism of resistance to biotic stress and tolerance to abiotic stress. ✓ To understand different environmental factors like Physical environment; biotic environment; biotic and abiotic interactions. Habitat and Niche: concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. ✓ Learners will know Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemic extinctions, age structured population. ✓ To understand Species interactions: types of interactions, interspecific competition, herbivory, carnivory, pollination and symbiosis. Major terrestrial biomes, theory of island biogeography; biogeographical zones of India. Environmental

	<p>Botany- Present concern: Conservation of genetic resources, gene pools land races, Global warming and costal ecosystems. Depletion of forest cover, threats to mangroves. Urbanization and plant cover</p>
<p>M.Sc. Sem. II Course PSBO204</p>	<ul style="list-style-type: none"> ✓ Learners will understand medicinal property of plants Biological source, geographical distribution, physicochemical analysis of Tylophoraasthmatica (leaf), Fennel and Plantago (fruit/seed), Cinnamon and Holarrhena (bark) and Acorus (rhizome) and Tinospora root. Uses of Essential oils (Cinnamon, Eucalyptus and Citronella) fatty oil (Sesame, Safflower and coconut). Vegetable fat (Cocum butter and Mahua butter) And Medicinal uses of the above ✓ Learners will know Dietetics Therapeutic value of Indian plant foods :-a) rice wheat ; b) gram , green gram c) lemon, grapes and bananas; d) ginger, turmeric, coriander, garlic, asafoetida, cumin and clove. Plant food in the treatment of diseases - anorexia, arthritis constipation, diarrhoea, diabetes, exhaustion, hypertension, memory and piles.
<p>M.Sc. Sem. III Course PSBO301</p>	<ul style="list-style-type: none"> ✓ Learners will understand different Biostatistics, Hypothesis testing: Theory of errors – Type I and Type II errors, Null Hypothesis, z-test, Test of significance. Introduction to ANOVA, One-way & two-way ANOVA, Dunett’s test. Randomized Block Design and Latin Square. (5 problems to be solved in each category), Bioinformatics. Organization of biological data, databases (raw and processed), Queering in data bases. Gene finding, motif finding and multiple sequence alignment. Protein sequence analysis (theory and algorithms). Exploration of databases, retrieval of desired data, BLAST etc , pH and Buffers; Electrophoresis , pH and buffer solutions, acids and bases, hydrogen ion concentration, dissociation of acids and bases, measurement of pH, titration curves. Physiological Buffers. , Electrophoresis: Theory and application, PAGE (Native & SDS) and AGE , 2D Electrophoresis and Microscopy & Spectroscopy role Principles, instrumentation, working and applications of o Fluorescence microscope, TEM, SEM, Biological

	sample preparation for electron microscopy o IR, AAS , Plasma Emission spectroscopy, NMR, MS.
M.Sc. Sem. III Course PSBO302	<ul style="list-style-type: none"> ✓ Learners will understand Molecular details of DNA replication in prokaryotes and eukaryotes. Assembly of raw DNA into nucleosomes. DNA recombination, hollidaymodel for recombination. Transcription, RNA synthesis, classes of RNA and the genes that code for them. Transcription of protein coding genes, prokaryotes and eukaryotes, mRNA molecule. Transcription of other genes, ribosomal RNA, and ribosomes, tRNA. RNA processing, Capping, polyadenylation, splicing, introns and exons. snRNA, Types of snRNA, snRNA in spliceosome, significance of snRNA, Non coding RNAs, ribozyme, riboswitches, RNA localization. Translation of Protein structure, nature of genetic code, translation of genetic message and Post translational modifications, localization, chaperons.
M.Sc. Sem. III Course PSBOMPP303	<ul style="list-style-type: none"> ✓ Learners will understand History of Mycology and Plant Pathology in India and contribution of Mycologists and Plant Pathologists: o C J. Alexopoulos o E. A. Bessey o K. S. Bilgrami o E. A. Butler o K. S. Thind o M. N. Kamat o R. N. Tendon. Soil Mycology: o Various techniques to determine the fungal population in soil. o Various interactions amongst the soil fungi and other organisms. o Keratinophilic fungi ✓ To understand Fungal Taxonomy & Life history and Systematic position of fungi Fungal Taxonomy: A comparative account of outline systems of classification of fungi proposed by Bessey and Ainsworth. Polyphasic taxonomy- morphology, enzymatic and molecular characteristics of class Ascomycetes and Basidiomycetes. Life cycle and Systematic position of the following fungi: Myxomycetes: Physarumpolycephalum, Ascomycetes:Clavicepspurpurea Basidiomycetes: Ganoderma ✓ Different Fungal Physiology with Mode of nutrition- Saprophytic, parasitic, mutualistic, hyperparasitic, predaceous. Nutrition in fungi with reference to: i)

	<p>Carbon ii) Sulphur iii) Potassium iv) Magnesium v) Nicotinic acid vi) Riboflavin, vi) Nitrogen, vii) Phosphorus, viii) Thiamine ix) Folic acid x) Pantothenic acid xi) Iron Melvonate pathway, Shikimic acid pathway</p> <ul style="list-style-type: none"> ✓ Learners will know about Fungal Cytology, and Ecology Fungal Cytology: Microscopic structure of fungal cell, Chemical composition and functional attributes of fungal septa and cell wall. Fungal Ecology: A) Physical Environmental factors influencing fungal growth: i) Light ii) Hydrostatic pressure iii) Radiations.
<p>M.Sc. Sem. III Course PSBOMPP304</p>	<ul style="list-style-type: none"> ✓ Learners will understand Pathogenesis and Crop Pathology Prepenetration, Penetration and entry of pathogen into host tissue – mechanical, physiological, enzymatic and through natural openings • Host-parasite interaction • enzymes and toxins in pathogenesis • Significance of phyllosphere and rhizosphere fungi • Crop Pathology: Causal organism, Symptoms, Disease Cycle and Control measures of the following diseases i) Wart of potato ii) Downy mildew of grapes iii) Bunt of rice iv) Citrus canker ✓ To understand Seed Mycoflora & Seed Pathology Seed Mycoflora: Fungi on seeds- a) Field Fungi b) Storage Fungi – i) Characteristics of major storage fungi ii) Effect of storage fungi iii) Control of storage fungi , Seed Pathology: Pathological Effects of Seed borne diseases- i) Seed abortion ii) Shrunken seeds & Reduced seed size iii) Seed rot iii) Sclerotisation & Stromatisation iv) Seed discolouration v) Reduced or complete loss of germinability ✓ Learners will know Cultural Studies and Food borne Fungi which includes Cultural Studies in Fungi: Culture Media and their types based on i) Empirical use ii) Physical states iii) Chemical composition • Food borne fungi: Common contaminants of i) Fresh food, ii) Processed food iii) Stored food • Use of chemical preservatives to protect the food against contamination 1 Unit IV: Industrial Mycology • Fungal enzymes, extraction and purification • Industrial application of fungal enzymes – i) Protease

	<p>ii) Cellulase iii) Invertase iv) Phosphatase • Uses of immobilization technique in fermentation by fungi • Fermenters- design and construction, types of fermenters, aseptic operation and use of computer in fermenters, maintenance, types of fermentation process - batch fermentation, fed-batch fermentation, continuous fermentation, scale up of fermentations, industrial processes- upstream and down-stream processes, strain improvement of microbes • Organic Acid Industry - Sources and methods of production of vinegar, and citric acid.</p>
M.Sc. Sem. IV Course PSBO401	<ul style="list-style-type: none"> ✓ Learners will understand Centrifugation, Basics principle of Sedimentation, Types of rotors, Differential & density gradient centrifugation and Preparative centrifugation & Applications; Analytical centrifugation & applications. ✓ To understand Chromatography its General Principle of chromatography. Techniques and applications of Ion exchange, Affinity Chromatography & HPLC and Application of HPTLC & HPLC in validation of herbal drugs. ✓ Tracer techniques & PCR and Pattern and rate of radioactive decay, Units of radioactivity, Stable Isotopes , Principle, instrumentation & technique: Geiger-Muller counter, Liquid scintillation counters & Autoradiography , Applications of isotopes in biology: Tracer techniques & Autoradiography, PCR and its applications 1 Unit IV: Nanotechnology & IPR , Synthesis of nanoparticles using biological samples. Characterization of nanoparticles (FTIR, SEM, TEM, STEM, Scanning Tunneling Microscope, Atomic Force Microscope, UV-Vis.). IPR: Objectives, process & scope.
M.Sc. Sem. IV Course PSBO402	<ul style="list-style-type: none"> ✓ Learners will understand different Gene Regulation I, Regulations of gene expression in bacteria – trp operon, ara operon, histidine operon. Regulation of gene expression in bacteriophage λ. ✓ To understand Gene Regulation II , Control of gene expression in eukaryotes, Transcriptional control, RNA processing control, mRNA translocation control, mRNA degradation control, protein degradation

	<p>control Gene Regulation III , Genetic regulation of development in Drosophila Developmental stages in Drosophila – embryonic development, imaginal discs, homeotic genes</p> <ul style="list-style-type: none"> ✓ Learners will understand Cell signaling, Hormones and their receptors, cell surface receptor, intracellular receptor, signaling through G-protein coupled receptors, signal relay pathways-signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two-component systems, light signaling in plants, bacterial chemotaxis and quorum sensing. Forms of signalling (paracrine, synaptic, autocrine, endocrine, cell to cell contact).
<p>M.Sc. Sem. IV Course PSBOMPP403</p>	<ul style="list-style-type: none"> ✓ Learners will know History of Mycology and Plant Pathology in India and contribution of Mycologists and Plant Pathologists:i) S. D. Garrett ii) K. C. Mehta iii) B. B. Mundkur iv) C. V. Subramaniam v) T. S. Sadashivan vi) M. J. Thirumalachar vii) John Webster , Soil Mycology: Distribution of Mycoflora with relation to the soil factors - i) Texture ii) Moisture iii) Temperature iv) Aeration v) pH vi) Organic matter, Phosphate solubilizing fungi, Organic matter decomposition and humus formation, its importance in agriculture. ✓ To understand Fungal Taxonomy & Life history and Systematic position of fungi Fungal Taxonomy: A comparative account of systems of classification of fungi proposed by i) Smith ii) Martin ,Phylogenetic system, ICBN, Basic Principles , major rules, effective and valid publications, Nomenclature of fungi , Life cycle and Systematic position of the following fungi: Phycomycetes: Saprolegnia Basidiomycetes: CyathusDeuteromycetes: Helminthosporium ✓ To understand characteristic Fungal Physiology, Fungal Metabolites: Acetate and Nitrogenous metabolites, Aromatic terpenes, Pigments in Fungi, Organic Acids from fungi , Fungi in Nanotechnology ,Fungal Genetics and Ecology and different Fungal Genetics: Study of fungal genetics with reference to – Nuclear behavior during cell division . i) Neurospora ii) Saccharomyces iii) Pucciniagraminis iv) Ustilago,Parasexual cycle, Heterokaryosis, Fungal

	<p>Diversity: i) Fresh water fungi ii) Marine fungi iii) Coprophilous fungi iv) Aero-fungi Environmental factors influencing fungal growth: i) Humidity ii) Temperature , Fungal Diversity: Anamorphic fungi- i) Nematophagous fungi ii) Aquatic hyphomycetous fungi iii) Aero-aquatic fungi and Colonization strategies in fungi.</p>
<p>M.Sc. Sem. IV Course PSBOMPP404</p>	<p>✓ Learners will understand Pathogenesis and Crop Pathogeny Symptomology , Study of various symptoms of plant diseases caused by fungi. Defense mechanism in plants-Pre-existing structural and biochemical defense mechanisms, lack of essential nutrients. Induced structural and biochemical defense mechanisms, inactivation of pathogen enzymes and toxins, altered biosynthetic pathways. Plant disease management : Physical: Exclusion, eradication and protection. Chemical disease control:- common fungicides, antibiotics and nematicides. Biological disease control: Phytoalexins. Crop Pathology: Causal organism, Symptoms, Disease Cycle and Control measures of the following diseases; i) Club root of cabbage ii) Coffee Rust iii) Brown spot of rice iv) Papaya mosaic. Seed Mycoflora& Seed Pathology and Seed Mycoflora: Detection of Seed borne pathogens by- i) Washing test ii) Incubation method: a) Blotter method b) Agar plate method . Seed Pathology: Management of Seed borne diseases - i) Chemicals ii) Antibiotics iii) Biological control agents iv) Host – Resistance in disease management. Cultural Studies and Fungal Toxins , Cultural Studies in Fungi: Preservation techniques of fungal cultures – i) Sub-culturing ii) Storage under mineral oil iii) Storage in distilled water iv) Storage by drying v) Storage by freezing</p> <p>✓ To understand Fungal Toxins: Mycotoxins- historical background, detection, estimation, effect on human /animal health. • Mycotoxins and their types i) Alternaria Toxins ii) Citrinin iii) Ochratoxins iv) Patolin v) Penicillic Acid vii) Sterigmatocystin viii) Zearalenone</p> <p>✓ Learners will have knowledge of Industrial Mycology Fungal bio-conversions of Lignocellulose</p>

	<p>materials i) Lignocellulose ii) Potential bio-products and their applications , Fungal bioremediation , Food Industry- SCP single cell protien- advantages and disadvantages, production of yeast biomass, production of mycoproteins, traditional fungal foods (Shoyu, Miso, Sake, Tempeh)</p>
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