

SYLLABUS PLAN 2016-17
SEMESTER WISE

Academic Planner for B.Sc. (Medical) –I (Sem –I) BOTANY (2016-17)

PAPER – IV: DIVERSITY OF MICROBES AND CRYPTOGAMS

Teachers Name: Mandeep Kaur (Assistant Professor in Botany)

Month	Syllabus	
	Theory	Practical
July	Viruses and Bacteria: General account of viruses and mycoplasma. Bacteria – structure, nutrition, reproduction and economic importance. General account of cyanobacteria with emphasis on <i>Oscillatoria</i> .	Study of the genera included under algae indicating their systematic position.
August	Algae: General characters, classification and economic importance: important features and life history of Chlorophyceae – <i>Volvox</i> , <i>Spirogyra</i> and <i>Chara</i> ; Xanthophyceae <i>Vaucheria</i> ; Phaeophyceae- <i>Ectocarpus</i> , <i>Sargassum</i> ; Rhodophyceae- <i>Batrachospermum</i> . Fungi: General characters. Classification and economic importance; important features and life history of Mastigomycotina – <i>Phytophthora</i> ; Zygomycotina – <i>Mucor</i> ; Ascomycotina – <i>Saccharomyces</i> , <i>Penicillium</i> , <i>Peziza</i> .	Study of the genera included under fungi indicating their systematic position.
September	Basidiomycotina – <i>Puccinia</i> , <i>Ustilago</i> , <i>Agaricus</i> ; Mitosporic Fungi – <i>Cercospora</i> , <i>Colletotrichum</i> ; Lichens: Structure, morphology, reproduction and economic importance.	Observation of disease symptoms in hosts infected by bacteria – (Citrus canker), fungi – (Late blight of potato, loose smut of wheat, black rust of wheat, tikka disease of groundnut, red rot of sugarcane), viruses – (Yellow vein mosaic of bhindi) and mycoplasma – (little leaf disease of brinjal). Examination of diseased material and identification of pathogens.
October	Bryophyta: Amphibians of Plant Kingdom displaying alternation of generations; structure, reproduction and classification of Hepaticopsida (<i>Marchantia</i>); Anthocerotopsida (<i>Anthoceros</i>); Bryopsida (<i>Funaria</i>) – developmental stages are excluded.	Study of morphology, reproductive structures and anatomy of the examples cited in theory under Bryophyta and Pteridophyta indicating their systematic position.
November	Pteridophyta: The first vascular plants: important characteristics, structure and reproduction of Psilopsida (<i>Rhynia</i>); Lycopsida (<i>Lycopodium</i> , <i>Selaginella</i>); Sphenopsida (<i>Equisetum</i>) and Pteropsida (<i>Pteris</i> and <i>Marsilea</i>) – developmental stages are excluded.	Gram staining of bacteria. Study of crustose, foliose and other types of lichen thalli.

B.SC. Medical-I (SEMESTER-II)
SUBJECT- BOTANY (Paper-IX)
Cell Biology, Genetics and Evolution
Teacher: Prof. Rajdeep Singh Dhaliwal

MONTH	THEORY	PRACTICAL
JANUARY	<p>General Structure of Cell: Prokaryotic Cell and Eukaryotic Cell, cell envelopes: Plasma membrane; bilayer lipid structure; functions; the cell wall.</p> <p>Structure and function of cell organelles: Mitochondria, Plastids, Ribosomes, Golgi body, Endoplasmic Reticulum, Peroxisomes, Vacuoles.</p> <p>Cell division: Mitosis; meiosis, control of cell division.</p>	<p>1. To study cell structure from onion leaf peels.</p> <p>2. Examination of electron micrographs of eukaryotic cells with special reference to organelles.</p>
FEBRUARY	<p>Structure and function of nucleus: Ultrastructure of nuclear membrane, nuclear pore; nucleolus.</p> <p>Chromosome organization: Morphology; centromere and telomere; chromosome alterations — deletions, duplications, translocations, inversions. Variations in chromosome number — aneuploidy, polyploidy. Special type of chromosomes- polytene and lampbrush chromosomes.</p>	<p>3. Examination of various stages of mitosis and meiosis using appropriate plant material (e.g. onion root tips, onion flower buds).</p> <p>4. Preparation of karyotypes from dividing root tip cells of Allium.</p> <p>5. Study of pollen mitosis of Impatiens balsamina.</p>
MARCH	<p>Genetic inheritance: Mendelism; laws of segregation and independent assortment; linkage analysis; allelic and non-allelic interactions.</p> <p>DNA the genetic material: DNA structure; replication; DNA — protein interaction; the nucleosome model. Genetic code; satellite and repetitive DNA.</p> <p>Gene expression: Structure of gene; transfer of genetic information—transcription, translation, protein synthesis; regulation of gene expression in prokaryotes and eukaryotes. Proteins ID, 2D and 3D structure</p>	<p>6. Study of special types of chromosomes from slides/photographs.</p> <p>7. Working out the laws of inheritance using seed mixture data provided using Chi-square methods.</p>
APRIL	<p>Genetic Variations: Mutations — spontaneous and induced; transposable genetic elements.</p> <p>Evolution: Brief account of origin of life, evolutionary theories of Lamarck, Darwin and DeVries. evidences for organic evolution</p>	Repeat the Practicals

ACADEMIC PLANNER 2016-17 (Odd Sem)

B.SC.-II (MED.) SEMESTER-III, PAPER NO IV: SUBJECT- BOTANY

PAPER V: DIVERSITY AND SYSTEMATICS OF GYMNOSPERMS

PAPER VI: DIVERSITY AND SYSTEMATICS OF ANGIOSPERMS

Teacher Name: Rajdeep Singh Dhaliwal

MONTH	THEORY	PRACTICAL
July	Origin and evolution of Angiosperms giving suitable examples. Primitive and advanced characters of Angiosperms. Angiosperm taxonomy; brief history, aims and fundamental components (α - taxonomy, β -taxonomy and Ω -taxonomy); identification keys. International code of Botanical nomenclature: Principles and rules; taxonomic ranks; type concept.	<ol style="list-style-type: none"> 1. Rosaceae : Rose 2. Malvaceae: <i>Hibiscus, Abutilon</i>. 3. Asclepiadaceae: <i>Calotropis</i>. 4. Solanaceae: <i>Solanum, Withania</i>. 5. Euphorbiaceae: <i>Euphorbia, Phyllanthus</i>. 6. Asteraceae: <i>Helianthus, Ageratum</i> and <i>Sonchus</i>. 7. Lamiaceae: <i>Ocimum, Salvia</i>. 8. Liliaceae: <i>Asparagus, Allium</i>. 9. Poaceae: <i>Avena, Triticum</i>.
August	Classification of angiosperms; salient features of the systems proposed by Bentham and Hooker, Hutchinson and Engler and Prantl. Diagnostic features and technical description and taxonomic importance of flowering plants as illustrated by members of families Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Apiaceae, Cucurbitaceae, Rosaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Asteraceae, Lilliacae and Poaceae.	<ol style="list-style-type: none"> 1. Ranunculaceae: <i>Ranunculus, Delphinium</i>. 2. Brassicaceae: <i>Brassica, Iberis</i>. 3. Rutaceae: <i>Murraya, Citrus</i>. 4. Fabaceae: <i>Faboideae: Lathyrus, Trigonella</i>; Caesalpinioideae: <i>Cassia</i>; Mimosoideae: <i>Acacia, Albizzia</i>. 5. Apicaceae: <i>Coriandrum</i>. 6. Cucurbitaceae: <i>Cucurbita</i>
September	General features of gymnosperms and their classification; evolution and diversity of gymnosperms; geological time scale, fossilization and fossil gymnosperms. Distribution, Cytology and Economic Importance of Indian Gymnosperms. General characters of Pro-Gymnosperms, morphological features of <i>Arachaeopteris</i> and <i>Aneurophyton</i> ; origin and evolution of seed habit.	<p>Cycas: Study of microsporophyll, megasporophyll and mature seed. Study through permanent slides – normal root (T.S.) and ovule (L.S.) Study through hand sections– coralloid root (T.S.), rachis (T.S.), leaflet (V.S.), pollen grains (W.M.)</p> <p>Pinus: Long and dwarf shoot, male and female cones, winged seeds.</p>
October	General characters of Cycadales and Coniferales. Morphology, anatomy, reproduction and life cycle of <i>Cycas</i> and <i>Pinus</i> .	<p>Pinus: Study through permanent slides – root (T.S.), Male cone (L.S.), female cone (L.S.), ovule (L.S.), embryo (W.M.) showing polycotyledonous condition. Study through hand sections and preparation of permanent studies in young stem (T.S.), old stem (T.S., T.L.S. and R.L.S.), needle (T.S.), pollen grains (W.M.).</p>
November	General characters of Ephedrales and Gnetales. Morphology, anatomy and reproduction and life cycle of <i>Ephedra</i> and <i>Gnetum</i> .	<p>Ephedra: Structure of male and female cones. Hand sections – Stem (T.S.), maceration to show vessel structure; pollen grains (W.M.)</p>

B.SC. Medical-II (SEMESTER-IV)**SUBJECT- BOTANY (Paper-IV) Teacher: Prof. Rajdeep Singh Dhaliwal****Paper: VII: Plant Anatomy and****Paper: VIII: Development and Reproduction in Flowering Plants**

MONTH	THEORY	PRACTICAL
JANUARY	<p>1. Tissue Systems: Epidermal: stomata, guard cells, idioblasts, trichomes, nectaries, hydathodes. Fundamental: parenchyma, collenchyma, and sclerenchyma; Vascular system.</p> <p>2. The root system: the root apical meristem and its histological organization; anatomical details of Dicot and Monocot roots.</p>	<p>1. To study the anatomy of Dicot and Monocot root, stem and leaves from the locally available material.</p> <p>2. Study of anomalous secondary growth in <i>Boerhavia</i>, <i>Nyctanthus</i>, <i>Bougainvillea</i>, <i>Mirabilis</i>.</p> <p>3. Maceration of wood to study different tracheary elements.</p>
FEBRUARY	<p>3. The shoot system: The shoot apical meristem and its histological organization. Anatomical details of Dicot and Monocot stems. Cambium and its functions. Secondary growth including anomalous secondary growth</p> <p>4. Leaf: Anatomy in Dicots and Monocots and modification with special reference to their function. Study of stomatal types.</p>	<p>4. Study of stomata from epidermal peel.</p> <p>5. Examination of flowers for their pollination mechanism (<i>Salvia</i>, <i>Ficus</i>, <i>Calotropis</i>, <i>Triticum</i>).</p> <p>6. Structure of anther, microsporogenesis (using slides) and pollen grains and pollinia (using whole mounts).</p> <p>7. Study of Pollen viability using glycerol-acetocarmine.</p> <p>8. Structure of ovule and embryo sac. (Permanent slides)</p>
MARCH	<p>1. Vegetative Reproduction: Various methods of vegetative propagation and applications in floriculture and horticulture. Apomixis: a general account.</p> <p>2. Flower: a modified shoot; structure, development of flower; Inflorescence types; structure of anther and pistil</p>	<p>9. Nuclear and cellular endosperm. Embryo development in monocots and dicots. (Permanent slides)</p> <p>10. Simple experiments to show vegetative propagation (leaf cuttings in <i>Bryophyllum</i>; stem cuttings in rose, money plant, sugarcane and <i>Bougainvillea</i>).</p>
APRIL	<p>3. Male and female gametophytes; types of pollination; pollen-pistil interaction, self incompatibility. double fertilization</p> <p>4. Post fertilization changes, endosperm and embryo development; seed structure, development, dormancy and dispersal; fruit development and types.</p>	<p>11. Testing percentage seed viability through tetrazolium chloride and actual seed germination.</p> <p>12. Study of placentation, fruit types and seed types.</p>

ACADEMIC PLANNER, B.SC.-II (MED.) SEMESTER-V

Teacher Name: (Rajdeep Singh Dhaliwal)

SUBJECT- Paper –III-BOTANY

PAPER - IX: PLANT PHYSIOLOGY & PAPER -X: PLANT GROWTH, DEVELOPMENT AND BIOTECHNOLOGY

Month	Theory	Practical
July	<p>Photosynthesis: Significance; historical aspects; photosynthetic pigments; action spectra and enhancement effect; concept of two photosystems; Z-scheme; photophosphorylation; Calvin cycle; C₄ pathway; CAM plants; photorespiration.</p> <p>Respiration: ATP- the biological energy currency; aerobic and anaerobic respiration; Kreb's cycle; electron transport mechanism (chemi-osmotic theory) redox potential; oxidative phosphorylation; pentose phosphate pathway.</p>	<ol style="list-style-type: none"> 1. To study the permeability of plasma membrane using different concentrations of organic solvents. 2. To study the effect of temperature on permeability of plasma membrane. 3. To study the enzyme activity of catalase and peroxidase. 4. To demonstrate of the rate of respiration of various plants. 5. Separation of chloroplast pigments by solvent method.
August	<p>Tools and techniques of recombinant DNA technology with special reference to restriction enzymes, gel electrophoresis, Southern blotting, cloning vectors and PCR. Genomic and cDNA library. Techniques of gene mapping and chromosome walking; methods of gene transfer in plants. Basic concept of plant tissue, culture, totipotency, micropropagation, anther culture, embryo culture, synthetic seeds and somatic hybridization. Biotechnology and its application in human welfare with particular reference to industry, plant breeding and molecular farming.</p>	<ol style="list-style-type: none"> 6. Demonstration of the osmotic potential of vacuolar sap by plasmolytic method. 7. Demonstration of the water potential of any tuber. 8. Separation of amino acids in the mixture by paper chromatography and their identification by Comparison with standard. 9. Demonstration of the technique of micropropagation by using different explants e.g. auxiliary buds, shoot meristems. 10. Demonstration of the techniques of anther culture.
September	<p>Plant-water relations: Importance of water to plant life; diffusion and osmosis; absorption, transport of water and transpiration; mechanism of stomatal opening and closing. Mineral nutrition: Essential macro- and micro-elements and their role; mineral uptake; deficiency and toxicity symptoms. Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation. Basics of enzymology: Discovery and nomenclature; characteristics of enzymes; concepts of holoenzyme, apoenzyme, coenzyme and cofactors; regulation of enzyme activity; mechanism of action.</p>	<ol style="list-style-type: none"> 11. Isolation of protoplasts from different tissues using commercially available enzymes (Demonstration only). 12. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones. 13. Preparation of synthetic seeds in potato and sugarcane. 14. Separation of proteins of a given sample through Gel Electrophoresis. 15. Demonstration of necessity of light, CO₂, and Chlorophyll for photosynthesis. 16. Demonstration of rate of transpiration by Ganong's apparatus.
October	<p>Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation. Lipid metabolism: Structure and function of lipids; fatty acid biosynthesis; β-oxidation; saturated and unsaturated fatty acids.</p>	<ol style="list-style-type: none"> 17. Comparison of loss of water from two surfaces of leaf by 4 leaf method. 18. Demonstration of path of Ascent of sap by eocin ringing experiment. 19. Demonstration of phototropism and geotropism.

November	<p>Growth, phases of growth, growth kinetics; plant hormones: discovery, bioassay, physiological effects and application of auxins, gibberellins, cytokinins, abscisic acid and ethylene. Photomorphogenesis, discovery, structure, physiological role and mechanism of action of phytochrome and cryptochrome. Photoperiodism, vernalization, biological clocks, physiology of senescence and abscission. Physiology of seed dormancy and seed germination; plant movements.</p>	<p>20. Demonstration of the presence of reducing sugars, fats and proteins in plant tissue by micro-chemical tests.</p> <p>21. To determine the seed viability through Triphenyl Tetrazolium chloride and actual germination Tests.</p>
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ACADEMIC PLANNER, (2016-17) Prof. Mandeep Kaur
B.SC. Medical-III (SEMESTER-VI) SUBJECT-BOTANY Paper -III (PAPER-XI and XII)

MONTH	THEORY	PRACTICAL
JAN	<p>Concept of ecology and its scope. Environmental factors: climatic, edapic, topographic and biotic, Shelfords law of tolerance.</p> <p>Population ecology: Characteristics, positive and negative interaction, growth forms, carrying capacity, ecotypes and ecads.</p> <p>Community ecology: Community characteristics, frequency, density and abundance, cover, life forms. ecological succession (Hydrosere, Xerosere). Gause principle of competitive exclusion.</p> <p>Medicinal Plants: General account pertaining to botanical name, family, part used and active principle in case of belladonna, neem, tulsi, stevia, rauwolfia, ashwagandha and glycyrrhiza.</p>	<ol style="list-style-type: none"> To determine minimum number of quadrats required for study of a grassland. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard Frequency Diagram. To estimate Importance Value Index (IVI) for grassland species on the basis of relative frequency, relative density and relative biomass in protected and grazed grassland. To determine moisture content and water holding capacity of grassland and woodland soil. Fibres: Study of cotton flower, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibres. Microscopic study of cotton and test for cellulose. Sectioning and staining of jute stem showing the location and development of fibres. Microscopic structure. Tests for ligno-cellulose.
FEB	<p>Structure and concept of ecosystem, ecological pyramids, food chain, food web, ecological energetics, ecological productivity.</p> <p>Environmental issues: Brief idea of air, water, noise and soil pollution. Global warming and ozone depletion. International efforts for mitigation of global climate change.</p> <p>Ecological adaptations in xerophytes, hydrophytes and halophytes.</p> <p>Biogeochemical cycles with particular reference to C, N and P.</p> <p>Forest products: Wood, properties, seasoning and importance, important timber plants of India.</p> <p>Brief history of origin of food plants; cultivation practice and recommended varieties of wheat, rice, potato and sugarcane with particular reference to Punjab.</p>	<ol style="list-style-type: none"> To measure the vegetation cover of a grassland through point frame method. To measure the above ground plant biomass in a grassland. To determine Kemp's constant for dicot and monocot leaves and to estimate the leaf area index of a grassland community. To determine diversity indices (Richness, Simpson, Shannon Wiener) in grazed and protected grassland. To estimate bulk density and porosity of grassland and woodland soil. Field Visits: To study sources of firewood (10 plants), timber-yielding trees (10 trees) and bamboos. A list to be prepared mentioning special features. To study the vegetation structure through profile diagram.
MARCH	<p>Biodiversity: Types and conservation, concept of hot spots, biomes, phytogeographic regions of India, vegetation types (Forests, Grasslands, Wetlands).</p> <p>The importance and nature of plant products; fibres: surface fibres (cotton), soft fibres (Jute), hard fibres (Cair).</p> <p>Cultivation practices and use of soyabean, sunflower, mustard, groundnut and coconut.</p> <p>Vegetables, and Fruits: Botanical name, family, season and area of cultivation of potato, tomato, brinjal, carrot, ladyfinger, pea, mango, apple, banana, guava, kinnow and grapes.</p>	<ol style="list-style-type: none"> To estimate transparency, pH and temperature of different water bodies. To measure dissolved oxygen content in polluted and unpolluted water samples. To estimate salinity of different water samples. To determine the per cent leaf area injury of different leaf samples collected around polluted sites. To demonstrate dust holding capacity of the leaves of different plant species. Vegetable Oils: study of hand sections of groundnut, mustard and coconut and staining of oil droplets with Sudan III and Sudan Black.
APRIL	<p>Spices: General account pertaining to botanical name, family and part used in case of cloves, cardamom, black pepper, turmeric, cumin and ginger.</p> <p>Beverages: Cultivation practices, botanical name, family and active ingredients of tea and coffee.</p> <p>Rubber: Major sources, cultivation, processing and uses of Para rubber.</p> <p>Narcotics: Cannabis, tobacco and opium.</p>	<ol style="list-style-type: none"> Food Plants: Study of the morphology, structure and simple micro chemical tests of the food storing tissues in rice, wheat, maize, potato and sugarcane. Microscopic examination of starch in these plants (excepting sugarcane). Spices: Examine Black pepper, cloves, cinnamon (hand sections) and open fruits of cardamom and describe them briefly. Preparation of an illustrated inventory of 10 medicinal plants and their uses in indigenous systems of medicine of allopathy: Write their botanical and common names, parts used and diseases/disorders for which they are prescribed. Beverages: Section of boiled coffee beans and tea leaves to study the characteristic structural features.