DEPARTMENT OF BOTANY

Teaching Plan

Session- 2024-2025 (Odd Semester)

Dr. Naghma Praween

B.Sc. (HONS) Botany

Semester-III

Bryophytes, Pteridophytes and Gymnosperms : Practical

DSC – 8

Theory	Allocation of Lectures	Month wise schedule	Tutorial/Assignment/ Presentation	Reading suggestions
1. Riccia – Morphology: Vegetative and reproductive structures (Specimen). **2. Marchantia - Morphology; V.S. of thallus through Gemma cup, whole mount of Gemmae (temporary slides); V.S. of Vegetative thallus, Antheridiophore, Archegoniophore, L.S. of Sporophyte (permanent slides).** **3. Pellia - Morphological details through specimens/permanent slides; L.S. Sporophyte (permanent slide).** **4. Porella - Vegetative Morphological details through specimens/permanent slides.** **5. Anthoceros – Morphology; Dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), V.S. of thallus (permanent slide).** **6. Funaria - Morphology; T.S. Stem (temporary and permanent slides both); Sporophyte: operculum, peristome, spores (temporary slides); Antheridial and archegonial heads, L.S. of capsule, W.M. of protonema (Permanent slides).**		August 2024		Bhatnagar, S.P., Moitra, A. (2023). Gymnosperms. 2nd edition, New Delhi. Vashishta, P.C., Sinha, A.K., Kumar, A. (2022). Botany For Degree Students Pteridophyta, New Delhi, Delhi: S. Chand Publication. Delhi, India.

5. Psilotum – Morphology (specimen); T.S. of rhizome, stem and synangium (permanent slides). **6. Selaginella – Morphology (specimen); W.M. of leaf with ligule, T.S. of stem, L.S. of strobilus, W.M. of microsporophyll, megasporophyll (temporary slides); T.S. of rhizophore (permanent slide).** **7. Equisetum – Morphology (specimen), T.S. of internode, L.S. of strobilus, T.S. of strobilus, W.M. of sporangiophore, W.M. of spores (wet and dry) (temporary slide).** **8. Pteris - Morphology, T.S. of rachis, V.S. of sporophyll (temporary slides), T.S. of rhizome, W.M. of prothallus with sex organs and young sporophyte (permanent slide).** **9. Cycas – Morphology, T.S. of coralloid root, T.S. of rachis, V.S. of leaflet, V.S. of microsporophyll, W.M. of spores (temporary slides); T.S. of stem, T.S. of root, L.S. of ovule (permanent slide).** **10. Pinus - Morphology, T.S. of Needle, L.S. and T.S. of male cone, W.M. of microsporophyll (temporary slides); T.S. of stem, R.L.S. and T.L.S. of stem, L.S. of female cone (permanent slide).** **11. Gnetum - Morphology (stem, male & female cones); T.S. of stem, L.S. of ovule (permanent slide).**		September 2024		**Vashistha, B.R., Sinha, A.K., Kumar, A. (2010). Botany For Degree Students, Bryophyta. New Delhi,**

12. Botanical Excursion and submission of digital catalogue/report of various species observed.				

B.Sc. (Prog) Life Science

Semester-I

Plant diversity and Systematics.

BOT-LS-DSC-1

Theory	Allocation of Lectures	Month wise schedule	Tutorial/Assignment/ Presentation	Reading suggestions
Unit 1: Diversity of Life Week: Classifying the diversity of life: Domains of Life –Eubacteria, Archaea and Systematics Eukaryotes. **Unit 2: Microbes Weeks:** **Viruses: General account; Replication, Lytic and Lysogenic cycle; Bacteria: structure, Wall-less forms (L-forms, Mycoplasma), asexual reproduction and genetic recombination.** **Unit 3: Algae Weeks: 1.5** **Brief introduction of major classes Blue green, Green, Brown and Red algae. Diagnostic features of identification; morphology, reproduction and classification with special reference to Nostoc, Volvox, and Spirogyra.** **Unit 4: Fungi Weeks: 1.5** **Diagnostic features of identification; morphology, reproduction and classification with special reference to Rhizopus, Penicillium and Agaricus; Lichens (a general account).** **Unit 5: Bryophytes, Pteridophytes and Gymnosperm Weeks: 03** **Characteristic features of identification, Morphology and reproduction of Bryophytes. Pteridophytes and Gymnosperms, with special reference to Marchantia, Funaria, Pteris and**		**August 2024** August 2024 September 2024	**Assignment**	Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, 4th edition. Vashishta, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. New Delhi. Singh, G. (2012). Plant Systematics: Theory and Practice, 3rd edition. Simpson, M.G. (2010). Plant Systematics.

Pinus (only morphology). **Unit 6: Angiosperms Week: 01** **Diagnostic features, Structure of flower, types of inflorescence** **Unit 7: Systematics Week: 0.5** **Aims, fundamental components of systematics description, identification, nomenclature,** **phylogeny, biosystematics.** **Unit 8: Systematics in Practices Weeks: 3.5** **Taxonomic Hierarchy- Concept of taxa and categories; Botanical Nomenclature-principles and** **rules; Type method; Author citation; Valid publication; Rejection of names, Principle of** **priority and its limitations; Names of hybrids and cultivars.** **Unit 9: Systems of classification Weeks: 1.5** **Classification: Artificial, Natural and Phylogenetic. An outline of Bentham and Hooker's (up** **to series only) and Engler and Prantl's (up to Subclasses) systems of classification and their** **merits and Demerits. APG System.**				
Practicals: 1 1. Viruses: EM of TMV and Bacteriophage, Specimens of virus infected plants (any two). (Week: 01) 2. Bacteria: EM of a bacterium, types through permanent slides/photographs, specimens of infected plants (any two). (Week: 01) 3. Algae: Study of vegetative and reproductive structures of (a) Nostoc (b) Volvox (c) Spirogyra through temporary preparations and permanent slides. (Week: 01) 4. Fungi: Study of vegetative and reproductive structures of (a) Rhizopus, (b) Penicillium, and (c) Agaricus through temporary preparations and permanent slides/specimens/photographs. (Week: 01)		**August 2024** **September 2024**		Pelczar, M.J. (2001). Microbiology, 5th edition.

5. Lichens: Crustose, Foliose and Fruticose (specimens/photographs). (Week: 01) 6. Bryophytes: Study of (a) Marchantia morphology of thallus, W.M. rhizoids and scales, V.S. thallus through gemma cup, W.M. gemmae (all temporary slides), V.S. antheridiophore, archegoniophore, L.S. sporophyte (all permanent slides), (b) Funaria: detailed study and classification from W.M. rhizoids, operculum, peristome, spores and permanent slides of archegonia, antheridia and capsule. (Weeks: 02) 7. Pteridophytes: Study of Pteris: T. S. of Rachis, V.S. of Sporophyll and W.M. of sporangium. (Week: 01) 8. Gymnosperms: Study of Pinus morphology of long & dwarf shoot, male and female cones (specimens) and T.S. of needle (permanent slides only). (Week: 01) 9. Herbarium technique (Mounting of a properly dried and pressed specimen of any wild plant on the herbarium sheet with complete herbarium label). (Week: 01) 10. Taxonomic study of characters of 1 plant from each of the following families (any four): Malvaceae, Solanaceae, Asteraceae, Fabaceace, and Liliaceae.		**October 2024** **November 2024**		

B.Sc. (H) Botany

Semester-V

Moleculer Biology of the cell

Theory	Allocation of Lectures	Month wise schedule	Tutorial/Assignment/ Presentation	Reading suggestions
Unit 1: Nucleic acids as carriers of genetic information 02 Hours Discovery of nucleic acids, Experiments that established nucleic acids (DNA & RNA) as the			**Assignment**	. **William S. Klug, Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino, & Darrell Killian (2019). Concepts of Genetics. Pearson; 12th edition.**

carrier of genetic information: Griffith's, Hershey & Chase, Avery, McLeod & McCarty, and Fraenkel-Conrat's experiment. Unit 2: Structure and organisation of the genetic material DNA double helix structure (Chargaff's rule; Watson and Crick model); salient features of DNA double helix. Types of DNA: A, B & Z conformations, denaturation and renaturation (only melting profile- Tm), types of RNA (mRNA, rRNA, tRNA, small RNAs). split genes (Phillip Sharp) Unit 3: Central Dogma and Genetic Code 04 Hours DISCIPLINE SPECIFIC CORE COURSE – 13: Molecular Biology of the Cell 31 Beadle and Tatum's one gene one enzyme hypothesis; The Central Dogma, Genetic code and its salient features, Experiments for deciphering Genetic code (Experiments by Nirenberg &Matthaei, and Har Gobind Khorana). Adaptor hypothesis by Crick; Baltimore and Temin's discovery of reverse transcription Unit 4: Replication of DNA 06 Hours Delbruck's Dispersive mechanism model; Bloch and Butler's conservative replication model; Messelson and Stahl's semi-conservative replication model; Mechanism - initiation, elongation and termination; Enzymes and other proteins involved in DNA replication; General principles – bidirectional, semiconservative and semi-discontinuous replication				2. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition. 3. Snustad, D.P. and Simmons, M.J. (2019). Principles of Genetics. John Wiley, 7th edition. 4. Russell, P. J. (2010). iGenetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.

(Replisome), RNA priming (Primase &Primosome); Various modes of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear dsDNA. **Replication of the 5'end of linear chromosome (end-replication problem & Telomerase).** **Unit 5: Mechanism of Transcription 05 Hours** **Transcription process in prokaryotes (Initiation, Elongation and Termination); structure and function of RNA polymerase enzyme; concept of promoters and transcription factors; comparison between prokaryotic and eukaryotic transcription; concept of post-transcriptional modifications (introduction to eukaryotic mRNA processing: 5' capping; Splicing and alternative splicing; 3' poly A tailing).** **Unit 6: Mechanism of Translation 05 Hours** **Translation in prokaryotes: Initiation, Elongation and Termination; concept of charging of tRNA and role of aminoacyl synthetases; ribosome structure and assembly (prokaryotes and eukaryotes); comparison between prokaryotic and eukaryotic translation; post-translational modifications (phosphorylation, glycosylation).** **Unit 7: Gene Regulation 05 Hours** **Gene regulation in prokaryotes: Operon concept; inducible & repressible systems; regulation of lactose metabolism in E. coli (inducible system, positive & negative control); regulation of**				

tryptophan synthesis (Repression-De-repression and concept of Attenuation) in E. coli. Gene regulation in eukaryotes: concept of gene silencing by DNA methylation and RNA interference.				

B.Sc. (H) Botany

Semester-V

Moleculer Biology of the cell

Practical

Practicals	Allocation of Lectures	Month wise schedule	Tutorial/Assi g nment/ Presentation	Reading suggestions
1. Isolation of plasmid and genomic DNA from E. coli and quantification using agarose gel electrophoresis 2. Isolation of genomic DNA from plant samples (atleast two different genera / species) using CTAB method and quantification using agarose gel electrophoresis 3. Quantification of unknown DNA by diphenylamine reagent (colorimetry). 4. To estimate the generation time of Escherichia coli (prokaryote) and budding yeast (eukaryote) by spectrophotometric measurement and plotting growth curve as an indirect method to study DNA replication 5. To study control of replication in budding yeast with the help of specific inhibitors (beta-lactams:-Clavulanic acid, Ceftazidime, Piperacillin, Ceftriaxone etc) and studying budding frequency. 6. To study control of transcription in Escherichia coli with the help of prokaryotic (Rifampicin) and eukaryotic (Actinomycin-D) transcription inhibitors and plotting growth curve 7. To study control of translation in Escherichia coli with the help of prokaryotic (Kanamycin / Streptomycin) inhibitors using an IPTG-inducible system. 8. To understand the regulation of lactose (lac) operon (positive & negative regulation)				Russell, P. J. (2010). iGenetics- A Molecular Approach. Benjamin Cummings,

and tryptophan (trp) operon (Repression and De-repression & Attenuation) through digital resources/data sets.				

B.Sc. (H) Botany

Semester-V

Skill Enhancement Course

Floriculture :Practical

1. Introduction to floriculture, tools and equipments. 2. Identification and preparation of an inventory of herbaceous flowering plants, climbers, shrubs and trees around the campus. 3. Study the various Physico chemical properties for understanding different soils/soil properties. 4. Methods of preparation of floral beds, soil preparation, greenhouse design and fumigation methods. 5. Project Report on any five flowering plants that are grown commercially , their share in the global market, methods used for selling the products and importance of the floriculture industry in job creation. 6. Field visit to nearby nursery / garden to understand basic aspects of Garden design.	Larson, R. A.(2012) . Introduction to Floriculture.