Savitribai Phule Pune University

Satyaniketan's

Adv. M.N.Deshmukh Arts, Science & Commerce College

Rajur

M. Sc. BOTANY

SEMISTER I AND SEMISTER II

TEACHING PLAN

(2023-24)

Submitted By

Mr. Awasarkar Umesh Dilip

Department of Botany

Satyaniketan's

Adv.M.N.Deshmukh Arts, Science and Commerce College Rajur

Tal. Akole, Dist. Ahmednagar. Pin. 422604.

M.Sc. (Botany) Part-I, Semester I

(For Colleges Affiliated to Savitribai Phule Pune University)

Unit Planning (2023-24)

BOUT 111: Botany Theory Paper I (Plant Systematics I)

Mr. Awasarkar Umesh Dilip

Sr. No	Month	Unit	Topics	Lecture
Credit -1.5 Algae - 22 Lecture				
1.	September	Systematics and Taxonomy	Principles, Concept of species and hierarchical taxa, Classification of algae up to order level as per Fritsch system (1935)	03
2.	September	Algological studies	Algal habitats, Pigment constitution in algae, Reserve food, Modes of perennation in algae, Origin and evolution of sex, Contribution of algal studies in India and world (any three phycologists)	04
3.	September	Cyanophyta	Distinguishing characters, thallus organization, ultra-structure of heterocyst and its significance.	03
4.	September	Chlorophyta	Thallus organization, reproduction asexual and sexual	03
5.	October	-	Introduction, Comparative structure and reproduction in Charophyta, Euglenophyta, Xanthophyta, Bacillariophyta and Chrysophyta	04
6.	October	Phaeophyta and Rhodophyta	Morphology, Reproduction and life cycle pattern in any one from each.	03
7.	October	Applications of algae	Commercial applications of algae- Biofertilizer, Medicine and Pollution	02
Credit -1.5 Fungi - 23 Lecture				
8.	October	-	Thallus structure, Nutrition, Cell structure, Hyphal modifications in Fungi. Classification of fungi as per Ainsworth et al system (1973), Contribution of fungal studies in India and world.	03
9.	October	Myxomy-cotina	Distinguishing characters, types of Plasmodium and fruit bodies, Life cycle pattern	03
10.	October	Mastigomy-cotina	Distinguishing characters, Thallus structure in Chytridiomycetes and Oomycetes.	03

Sr. No	Month	Unit	Topics	Lecture
11.	October	Zygomy-cotina	Distinguishing characters, Thallus structure, Heterothallism and sexual reproduction.	03
12.	October	Ascomy-cotina	Thallus structure, Fructifications, Comparative study of Hemiascomycetes and Euascomycetes.	03
13.	November	Basidiomyc otina	Distinguishing characters, thallus structure, types and structure of basidia and basidiocarps.	03
14.	November	Deuteromyc otina	Distinguishing characters, thallus structure, fructifications, types of conidia, conidial ontogeny.	03
15.	November	Application s of fungi	Biofertilizers, biocotrol, food and medicine.	02
Credit -1 Bryophytes - 15 Lecture				
16.	December	-	Introduction, characters, Affinities with thallophytes and pteridophytes,Contributions of bryologists in world and India (any three), Comparative system of classification according to G.M. Smith and R. M. Schuster(1972), pteridophytean and algal hypothesis, evolution of sporophyte, theory of sterilization and reduction, apogamy and apospory.	03
17.	December	-	Distribution, Distinguishing characters, morphology and anatomy of gametophyte and sporophytes of following orders 11 L Takakiales, Calobryales and Sphaerocarpales (1L), Marchantiales (1L), Jungermanniales (2L), Anthocerotales (1L), Sphagnales (1L), Polytrichales (1L),Funariales (1L), Andreaeales (1L), Eubryales (2L).	11
18.	December	Applications of bryophytes	Antimicrobial properties, secondary metabolites, therapeutical, horticultural applications.	01

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Unit Planning (2023-24)

BOUT 121: Botany Theory Paper 1- Plant Systematics II

Mr. Awasarkar Umesh Dilip

Sr. No	Month	Topics	Lecture
Credit I (1 Cr): Pteridophytes- 15 Lectures			
1.	February	Distinguishing Characters, Classification as per Sporne System (1975), Apospory, Apogamy, Stelar evolution, Heterospory and seed habit, Contributions of Indian and world Pteridologist (any three)	03
2.	February	Distribution, Distinguishing Characters, Morphology and anatomy of sporophyte and gametophyte of following orders Psilotales, Lycopodiales, Selaginellales, Isoetales, Equisetales, Ophioglossales, Marattiales, Osmundales, Filicales, Marsileales & Salviniales.	11
3.	February	**Applications of Pteridophytes**: medicinal, horticultural, biotechnological and secondary metabolites	01
Credit II (1.5 Cr) Gymnosperms – 22 lectures			
4.	March	Classification of gymnosperms by Raizada and Sahni (1960)	02
5.	March	Affinities of gymnosperms with Pteridophytes and Angiosperms.	02
6.	March	Distribution of gymnosperms worldwide and India.	01
7.	March	Economic aspects of gymnosperms	01
8.	March	General characters, morphology and affinities of Pteridospermales – Glossopteris Cycadeoidales – Cycadeoidea Pentoxylales - Pentoxylon Cordaitales – Mesoxylon Cycadales,Ginkgoales, Coniferales, Gnetales Epherales, Welwitschiales	10
9.	March	Comparative account of morphology, anatomy, sporogenesis, gametogenesis, embryology, and interrelationship of Cycadales and Ginkgoales	04
10.	March	Seed development in Gymnosperms	02

Sr. No	Month	Topics	Lecture
11.	April	Characteristic features of angiosperms, Angiosperm as a dominant group	02
12.	April	Importance and need for classification, hierarchical classification. Criteria used for classification; phases of plant classification. Overview on pre- and post-Darwinian systems of classification.	03
13.	April	Phylogenetic systems of classification as per Cronquist (1981).	01
14.	April	APG III system of classification.	01
15.	April	Phylogeny of Angiosperms: homology and analogy, parallelism and convergence, monophyly, paraphyly, polyphyly and clades, Phylogenetic tree and cladogram, Origin and evolution of angiosperms.	03
16.	April	Study of plant families with respect to general characters, morphology, economic importance and affinities following Bentham and Hooker and APG system of classification Amborellaceae, Nymphaeaceae, Hydatellaceae, Magnoliaceae, Araceae, Arecaceae, Papaveraceae, Amaranthaceae, Leguminosae, Malvaceae, Satalaceae, Acanthaceae, Asteraceae	13

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Unit Planning (2023-24)

BODT 124: Botany Theory paper 4- Mushroom cultivation and Biopesticides

Mr. Awasarkar Umesh Dilip

Sr. No	Month	Topics	Lecture
Credit-I (1 Cr): Mushroom culture - 15 Lectures			
1.	February	History of mushroom cultivation	01
2.	February	Present status of mushroom cultivation in India and abroad	01
3.	February	Edible and Poisonous mushrooms	01
4.	February	Nutritional and medicinal values of mushrooms	02
5.	February	Mushrooms spawn- spawning, running and cropping	01
6.	February	Cultivation of paddy straw mushroom- Volvariella and wood mushroom-Lentinus.	02
7.	March	Cultivation of Wheat straw mushroom- Pleurotus	01
8.	March	Cultivation of Button mushroom- Agaricus	02
9.	March	Management of pest in mushroom cultivation	01
10.	March	Recipes of edible mushrooms	01
11.	March	World commerce of t mushrooms	02
Credit-II (1 Cr): Bio-pesticides - 15 Lectures			
12.	March	Biological control of plant pathogens- concept and brief history	02
13.	March	Antagonism- Mechanism of biocontrol- Amensalism, Predation, Parasitism	02
14.	April	Applications of biological control in field- Crop rotation, irrigation, alteration of soil pH, Organic amendments, Introduction of Antagonists, Seed inoculation, Use of Mycorrhizal fungi and biofertilizers	03
15.	April	Bacterial pesticides, Viral pesticides, Mycopesticides, Mycoherbicides, Mycoweedicides, Myconematicides, Insects as biocontrol agents	03
16.	April	Botanical pesticides- Pyrethrum, Nicotine, Rotenone, Neem, Karanja	03
17.	April	Commercialization of biopesticides	02

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Unit Planning (2023-24)

BO 4.1 Computational Botany

Mr. Awasarkar Umesh Dilip

Sr. No	Month	Topics	Lecture
Credit I-Basic Biostatistics (15 L)			
1.	September	**1. Introduction to Statistics** Measures of central tendency – mean, mode, median and their properties Measures of dispersion – variance, standard deviation, coefficient of variance Symmetry and skewness, measures of skewness, kurtosis Sampling and sampling distributions – concept of sample and population, statistic, standard error, methods of sampling	09
2.	September	**2. Correlation and regression** Bivariate correlation, positive correlation, negative correlation Measures of correlation – Scatter diagram, Karl-Pearson's coefficient of correlation, Spearman's rank correlation coefficient Regression – Equations of regression lines using least square method, regression estimate and its standard error	06
3.	October	**Experimental Statistics (15 L)** 1.1 Statistics using R, SPSS and Excel : Introduction , features, installation, starting and ending of the sessions, R commands and case sensitivity (08L) a) Data types: Logical and Numerical b) Vectors and vector arithmetic c) Data frames: Creation using data, frame, subset and transform commands d) Statistical methods using R : Sampling methods, Diagrams, graphs: Measures of central tendency, Dispersion, Skewness and Kurtosis e) Probability Distributions: Hypergeomertric distribution, Binomial. Normal and poison distribution f) Correlation and Regression	03
4.	October	**1.2. SPPS** (Statistical Package for the Social Sciences) Software: Concept and applications in Means, t – test, ANOVA and Correlation and linear regression	02
5.	October	**1.3 Excel** : concept and applications on Biology	01
6.	October	**2. Testing of Hypothesis** : critical difference for pairs of treatments Tukey's test for pairwise comparison of	02

Sr. No	Month	Topics	Lecture
		treatments Dunnet's test for comparison of treatment means with control Duncan's multiple range test Mann–Whitney U test	
7.	November	**3. Testing of hypothesis 7L** Hypothesis, statistical hypothesis, critical region, level of significance, p-value, normal distribution T-test: t-test for mean, equality of two means, paired t-test, unpaired t-test, chisquare test: chi square test for goodness of fit, independence of attributes, non-parametric test	07
Credit III – Scientific Communication (15 L)			
8.	November	1. Importance of scientific communication Types of scientific communications Logical organization of scientific data and documentation	04
9.	November	2. Different modes of scientific communication Details of – Steps involved in Proposal writing, Research paper writing, Thesis writing	04
10.	November	3. Oral forms of scientific communication Popular and Scientific talks, Poster presentations	04
11.	November	4. Legal forms of communication of science 4 Ethics in scientific communication IPR, patent submission	03
Credit IV: Bio-analytical techniques & Bioinformatics (15L)			
12.	December	1. Making solutions – moles and molarity, stock solutions and dilutions, making media and reaction mixtures	04
13.	December	2. pH measurements and preparation of buffers	02
14.	December	3. Measuring concentrations using spectrophotometry, Cell counting using serial dilutions, haemocytometry	02
15.	December	4. Bioinformatics: What is Bioinformatics, What is database, Classification of database, Sequences and nomenclature, IUPAC symbols, Types of sequences used in Bioinformatics, Information sources: NCBI, the GDP, MGD.	04
16.	December	5. Data Retrieval tools – ENTREZ, OMIM, PubMed, Taxonomy Browsers, LocusLink, SRS. Database Similarity Searching – BLAST, FASTA, Resources for Gene Level Seqoences, Use of Bioinformatics tools in analysis	03

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BOUT 242: Theory Paper-2:
(Advanced Plant Ecology)

Mr. Awasarkar Umesh Dilip

Sr. No	Month	Topics	Lecture
Credit-I			
1.	February	Levels of species diversity and its measurement, indices of α-diversity, species rarefaction; β-diversity similarity & dissimilarity indices.	02
2.	February	Basis of Ecosystem classification. Types of Ecosystem: Desert (hot and cold), forest, rangeland, wetlands, lotic, lentic, estuarine (mangrove), Oceanic.	02
3.	February	Aquatic Ecology: Freshwater and marine, ecology of estuaries and intertidal zones, mangroves	02
4.	February	Ecosystem Stability: Concept (resistance and resilience), ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystems	02
5.	February	Biomes: Concept, basis of classification; Holdrige life zone classification; Characteristics of different biomes: Tundra, Taiga, Grassland, Deciduous forest biome, Alpine Biome, Chapparal, Savanna, Tropical Rain forest; adaptations in plants in various biomes	03
6.	March	Agro-ecological zones of India: basis of classification and characteristics	02
7.	March	Forest types of India (Champion and Seth, 1968): basis of classification and characteristics	02
Credit-II			
8.	March	Methods in field ecology: Methods of estimating population density of plants, ranging patterns through direct, indirect and remote observations, sampling methods in the study of habitat characterization: ground and remote sensing methods.	03
9.	March	Biodiversity and its conservation: Definition, types, importance of biodiversity and threats to biodiversity; Principles of conservation, major approaches to management; methods of conservation with examples; Indian case studies on onservation and management strategy (Sanctuaries/Sacred groves/National Parks/Botanical Gardens). Concept and basis of identification of ‘Hotspots’; hotspots in India.	05
10.	March	Concepts of gene pool, bio-piracy and bio-prospecting;	03

Sr. No	Month	Topics	Lecture
		Concept of restoration ecology; Extinct, Rare, Endangered and Threatened flora of India.	
11.	March	Environmental Biotechnology: Phytoremediation – definition, types and role of plants for in-situ and ex-situ remediation; bio-indicators, bio-fertilizers, biofuels and biosensors.	02
12.	March	Environmental issues: Local, regional and global; air, water, and soil pollution -kinds, sources, quality parameters; climate change and its relationship with plants; Use of plants in mitigation of pollution, effect on plants and ecosystems	03
Credit-III			
13.	March	Plant relations (eco-physiology) with climatic factors such as water, precipitation,temperature, light and radiation. Plant relations with edaphic factors: types of soil, soil moisture and water holding capacity of the soil, soil nutrients, soil microbes	04
14.	April	Plant-plant interaction, concept of allelopathy; Plant-animal interaction, herbivory, carnivorous plants; Plant- microbes interaction: Mutualism, parasitism	03
15.	April	Ecological/Environmental Ethics: Definition, concept, nature and origin of environmental ethics, ecological consciousness, views of developed and developing countries, environment community and equity, integrating ethical values and knowledge, self-centered development and environment	04
16.	April	Restoration ecology, plants in conservation of soils, restoration of land and degraded water bodies	02
17.	April	Overview of Environmental Laws in India:Wildlife Protection Act, 1972; Forest Conservation Act, 1982 (revised); Biological Diversity Act, 2002: National Forest Policy, 1988; National Environmental Policy, 2006	02
Credit-IV			
18.	March	Environmental Impact Assessment: Aims and objectives of Environmental Impact Assessment; concept, scope, process and necessity; Environmental Impact Statement (EIS) and Environmental Management Plan (EMP).	04
19.	March	EIA Guidelines; Impact Assessment Methodologies. Procedure for reviewing EIA of developmental projects.	01
20.	May	Life-cycle analysis, costbenefit analysis. Guidelines for Environmental Audit. Environmental Planning as a part of EIA and Environmental Audit	03
21.	May	Human impact on ecosystem and its consequences- Agriculture societies, degradation of natural resources.Impact of fertilizers, pesticides, fungicides and weedicides on crops and plants	02
22.	May	Bio-indicators of environmental degradation- Concept of Bio-indicators, bio indicators plants, role of bio-indicators in pollution control.	02
23.	May	Concept of carrying capacity; ecological foot print; sustainability 1Biomass carbon sequestration: above ground, belowground, deadwood, litter, soil organic carbon.	03