

THE UNIVERSITY OF BURDWAN

Proposed Curriculum and Syllabus
For B. Sc. (Honours) Botany



SEMESTER 1 & 2

Choice Based Credit System (CBCS)
(*w.e.f.* Academic Year 2017-2018)

SEMESTER 1

CC1

Topics Name	Lectures	Teacher
Unit 1: Introduction to microbial world Microbial nutrition, growth and metabolism. Economic importance of viruses with reference to vaccine production, role in medicine and as causal organisms of plant diseases. Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and antibiotics).	8	IB
Unit 2: Viruses Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to TMV, T2-Phage, viroids and prions; lytic and lysogenic cycle.	8	IB
Unit 3: Bacteria Discovery, general characteristics; Principles in Bacterial Taxonomy, Bergey's Man. of Syst. Bact.; 2nd Ed. – 2001-05; Types-Archaea, Eubacteria, wall-less forms (mycoplasma and spheroplasts); Cell structure; Bacterial Chromosome & extra-chromosomal genetic elements; Nutritional types; Vegetative Reproduction and genetic recombination (conjugation, transformation and transduction), Endospore.	14	IB
Unit 4: Algae General characteristics; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella; methods of reproduction; Classification; criteria, general concept of endosymbiosis, system of Fritsch' 1935 (only upto class), and evolutionary classification of Lee' 2008 (only upto groups); Significant contributions of important phycologists (F.E. Fritsch & M.O.P. Iyengar); Role of algae in the environment, agriculture, biotechnology and industry.	6	SM1
Unit 5: Cyanophyta and Xanthophyta Ecology and occurrence; Cell structure; Reproduction, Genetic recombination (in Cyanophyta); Morphology and life-cycle of <i>Vaucheria</i> .	6	SM1
Unit 6: Chlorophyta and Charophyta General characteristics; Occurrence; Cell structure. Life-cycles of <i>Volvox</i> , <i>Zygnema</i> , <i>Oedogonium</i> , <i>Coleochaete</i> and <i>Chara</i> .	10	SM1
Unit 7: Phaeophyta and Rhodophyta Characteristics; Occurrence; Cell structure; Reproduction. life-cycles of <i>Fucus</i> and <i>Polysiphonia</i> .	8	SM1
Practical-Microbiology		IB
Practical -Algae		SM1

Topics Name	Lectures	Teacher
Unit 1: Introduction Unifying features of archegoniates; Transition and adaptation to land habit; Alternation of generations.	4	MB
Unit 2: Bryophytes General characteristics & Classification [upto order] of Schuster (1968); Adaptations to land habit; Range of thallus organization.	6	SM2
Unit 3: Type Studies- Bryophytes Morphology, anatomy, reproduction and evolutionary trends in <i>Riccia</i> , <i>Marchantia</i> , <i>Pellia</i> , <i>Anthoceros</i> , <i>Sphagnum</i> and <i>Funaria</i> (developmental stages not included). Ecological and economic importance of bryophytes (a brief account).	12	SM2
Unit 4: Pteridophytes General characteristics; Classification (Pichi Sermolli, 1977 upto order); early land plants (<i>Cooksonia</i> and <i>Rhynia</i>).	6	CD
Unit 5: Type Studies- Pteridophytes Morphology, anatomy and reproduction of <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> and <i>Marsilea</i> (Developmental details not to be included). Apogamy, and apospory, heterospory and seed habit, telome theory, stelar evolution; Ecological and economic importance	14	CD
Unit 6: Gymnosperms General characteristics, classification (Stewart and Rothwell 1993, up to order), Morphology, anatomy and reproduction of <i>Cycas</i> , <i>Pinus</i> and <i>Gnetum</i> (Developmental details not to be included); Ecological and economic importance.	18	MB
Practical-<i>Marchantia sp</i>, <i>Anthoceros sp</i>, <i>Pelliasp</i> and <i>Funaria sp</i>.		SM2
Practical- <i>Lycopodium sp</i>, <i>Selaginella sp</i>, <i>Equisetum sp</i> and <i>Pteris sp</i>		CD
Practical- <i>Cycas sp</i>, <i>Pinus sp</i> and <i>Gnetum sp</i>		MB

SEMESTER 2

CC3

Topics Name	Lectures	Teacher
Unit 1: Introduction to true fungi General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; Classification (Alexopoulos & Mims, 1979).	6	CD
Unit 2: Chytridiomycota and Zygomycota Characteristic features; Thallus organisation; Life cycle with reference to Synchronium and Rhizopus.	5	CD
Unit 3: Ascomycota General characteristics, sexual reproduction and development of ascus and ascospores, types of ascocarp; Phenomenon of Heterokaryosis and parasexuality in asexual members; Life cycle of Saccharomyces, Talaromyces, Neurospora and Ascobolus	8	CD
Unit 4: Basidiomycota General characteristics; Phenomenon of dikaryotization, development of basidia and basidiospores and basidiocarp, Life cycle of Puccinia (Physiological Specialization) and Agaricus, Bioluminescence, Fairy Rings and Mushroom Cultivation.	8	CD
Unit 5: Allied Fungi General characteristics; Status of Slime molds, Occurrence; Types of plasmodia.	3	CD
Unit 6: Oomycota General characteristics; Life cycle of Phytophthora and Albugo	4	CD
Unit 7: Symbiotic associations Lichen – Occurrence; General characteristics; Range of thallus organization; Nature of associations of algal and fungal partners; Reproduction; Mycorrhiza-Ectomycorrhiza, Endomycorrhiza with special reference to VAM and their significance.	4	SM1
Unit 8: Applied Mycology Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides).	10	SM1; SM2
Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Symptomology; Koch's Postulate; Host-Pathogen relationships; Disease cycle and environmental relation; types of diseases, host defense mechanism; prevention and control of plant diseases (biological & chemical), and role of quarantine. Bacterial diseases – Citrus canker and bacterial blight of rice. Viral diseases – Tobacco Mosaic virus. Fungal diseases & Control – Late blight of potato, Ergot of rye; Black stem rust of wheat, loose and covered smut of wheat, White rust of crucifers.	12	SM2
Practical- Fungi 1. Study of the following genera and their identification: Rhizopus, Talaromyces, Alterneria, Ascobolus, Agaricus and Polyporus. 2. Identification of all the macroscopic and microscopic genera included in the theoretical syllabus.		CD
Practical- Plant Pathology 1. Identification of diseases prescribed in the theoretical syllabus. 2. Study of the following diseases: White rust, Rust of wheat/Justicia, loose smut of wheat. 3. Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early & Late blight of potato, Black stem rust of wheat and White rust of crucifers. 4. Mycorrhizae – Ecto and Endo mycorrhizae (photographs only)		SM2

Topics Name	Lectures	Teacher
Unit 1: Introduction and scope of Plant Anatomy: Applications in systematics, forensics and pharmacognosy.	01	IB
Unit 2: Structure and Development of Plant Body Internal organization of plant body: The three tissue systems, types of cells and tissues; Development of plant body: a brief account.	3	IB
Unit 3: Tissues Classification of tissues; Simple and complex tissues (no phylogeny); cyto-differentiation of tracheary elements and sieve elements; Cell wall and it's secondary growth; Pits and plasmodesmata; Ergastic substances. Hydathodes, cavities, lithocysts and laticifers	10	IB
Unit 4: Apical meristems. Evolution of concept of organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cytohistological zonation); Types of vascular bundles; Structural differences of dicot and monocot stem, root & leaf, Kranz anatomy. Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory); Quiescent centre; Endodermis, exodermis and origin of lateral root.	14	IB
Unit 5: Vascular Cambium and Wood : Structure, function and seasonal activity of cambium; Secondary growth in root and stem with special reference to Bignonia, Dracaena (Cordyline), Boerhaavia and Strychnos. Types of rays and axial parenchyma; Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood, tyloses; Dendrochronology. Development and composition of periderm; General account of Rhytidome and lenticels.	14	IB
Unit 6: Adaptive and Protective Systems. Epidermal tissue system, cuticle, epicuticular waxes, trichomes(uni-and multicellular, glandular and nonglandular, two examples of each), stomata (classification).	8	IB
Unit 7: Leaves and Inflorescence: Leaves – types, phyllotaxy and modifications; Inflorescence – Types and evolution	4	MB
Unit 8: Flower, Fruit and Seed: Types of flower; Aestivation, placentation – types and evolution. Floral formula & floral diagram; Adhesion-Cohesion of floral parts, micro and mega gameto- and sporogenesis; embryosac, Fruits – types, dispersal. Seed dispersal.	6	MB
Practical		
1. Study of anatomical details through permanent slides/temporary stain mounts/ macerations/museum specimens with the help of suitable examples		IB
2. Study of the secondary structures of stem of the following genera: Bignonia, Dracaena (Cordyline), Boerhaavia and Strychnos.		IB
3. Xylem: Tracheary elements-tracheids, vessel elements; thickenings; perforation plates;xylem fibres. (from permanent slides); Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres. (from permanent slides)		IB
4. Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular, lenticels		IB

5. Root: monocot, dicot, secondary growth (from permanent slides). Stem: monocot, dicot - primary and secondary growth; periderm (from permanent slides);		IB
6. Leaf: Different variations; C4 leaves (Kranz anatomy).		MB
7. Cystolith, lithocysts and Raphides.		MB
8. Types of inflorescence, placentation and fruits		MB