Department of _____BOTANY_____

Academic Calender and Academic Plan

1st Semester Honours Course (July 2018 - Dec 2018) CCH 01 - Phycology and Microbiology-Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 01	PHYCOLOGY	1. General account : 1.1. Thallus organization, Structure of algal cell, 1.2. Ultrastructure of Plastids and Flagella, 1.3. Origin and evolution of sex, 1.4. Life cycle patterns, 1.5. Significant contributions of important phycologists (Fritsch, Smith, R. N. Singh, T.V. Desikachary, H.D. Kumar, M.O.P. Iyengar)	Dr. A. Sarkar	July, 2018	
CCH 01		2. Classification: 2.1. Criteria and basis of Fritsch's classification 2.2. Classification by Lee (2008) upto phylum with examples 2.3. Salient features of Cyanobacteria, Rhodophyta, Chlorophyta , Charophyta, Bacillariophyta, Xanthophyta, Phaeophyta, Heterokantophyta.	Dr. A. Sarkar	August, 2018	
CCH 01		3. Cyanobacteria: 3.1. Ultrastructure of cell, 3.2. Heterocyst - structure and function, 3.3. Ecology.	Mr. S. Raha	July, 2018	
CCH 01		4. Bacillariophyta: 4.1. Cell structure, 4.2. Cell division, 4.3. Auxospore formation in Centrales and Pennales.	Mr. S. Raha	July, 2018	
CCH 01		5. Life History: 5.1. Chlamydomonas, 5.2. Oedogonium, 5.3. Chara, 5.4. Ectocarpus, 5.5. Polysiphonia, 5.6. Evolutionary significance of Prochloron.	Dr. A. Sarkar	August, 2018	

CCH 01	MICROBIOLOGY	1. Virus: 1.1. Discovery, 1.2.Plant virus- types, 1.3. Transmission and translocation of Plant virus, 1.4. TMV Physicochemical characteristics and Multiplication, 1.5. One step growth curve, 1.6. Lytic cycle (T4 phage) and Lysogenic cycle (Lambda phage), Significance of lysogeny, 1.7.Viroids and Prions.	Ms. A. Chaterjee	July, 2018	
CCH 01		2. Bacteria: 2.1. Discovery, .2.2. Distinguishing features of Archaea and Bacteria, 2.3. Characteristics of some major groups: Proteobacteria (Enterobacteria), Firmicutes, Mollicutes, Actinobacteria, Spirochaetes, Chlamydiae, 2.4. Bacterial growth curve and generation time, 2.5.Flagella (ultrastructure) & Pilli, 2.6. Cell wall – chemical structure and differences between Gram +ve & Gram – ve bacteria, 2.7. Bacterial genome and plasmid, 2.8. Endospore - formation, structure and function, 2.9.Genetic Recombination (a) Transformation – with special emphasis on Natural and Induced competence and DNA uptake, (b) Conjugation— F- factor, F+ X F–, Hfr X F–, concept of F', chromosome mobilization, (c) Transduction– Generalised and specialized.	Ms. A. Chaterjee	August, 2018	
CCH 01					
Course Outcome					

1st Semester Honours Course (July 2018 - Dec 2018) CCH 02 - Mycology and Phytopathology- Theory

Name of the paper	**Module or Unit No**	**Topic**	**Name of the teacher**	**To be Completed during**	**No of PPT classes**

CCH 02	MYCOLOGY	1. General Account: 1.1. Hyphal forms, 1.2. Fungal spore forms and mode of liberation, 1.3. Sexual reproduction and degeneration of sex, 1.4. Parasexuality and sexual compatibility, 1.5. Life cycle patterns.	Mr. P. Shaw	July, 2018	
CCH 02		2. Classification: 2.1. Classification of Fungi (Ainsworth, 1973) upto sub-division with diagnostic characters and examples. 2.2. General characteristics of Myxomycota, Oomycota, Zygomycota, Ascomycota, Basidiomycota, Deuteromycota.	Mr. P. Shaw	August, 2018	
CCH 02		3. Life history: 3.1. Synchytrium, 3.2. Rhizopus, 3.3. Ascobolus, 3.4. Agaricus.	Mr. P. Shaw	August, 2018	
CCH 02		4. Mycorrhiza: 4.1. Types with salient features, 4.2. Role in Agriculture & Forestry.	Mr. P. Shaw	Sept, 2018	
CCH 02		5. Lichen: 5.1. Types, 6.2. Reproduction, 6.3. Economic and ecological importance	Mr. P. Shaw	Sept, 2019	
CCH 02	PHYTO-PATHOLOGY	1. Terms and Definitions : 1.1. Disease concept, 1.2. Symptoms, 1.3. Etiology & causal complex, 1.4. Primary and secondary inocula, 1.5. Infection, 1.6. Pathogenecity and pathogenesis, 1.7. Necrotroph and Biotroph, 1.8. Koch's Postulates, 1.9. Endemic, Epidemic, Pandemic and Sporadic disease, 1.10. Disease triangle, 1.11. Disease cycle (monocyclic, polycyclic and polyetic).	Mr. S. Raha	August, 2018	

CCH 02		2. Host – Parasite Interaction: 2.1. Mechanism of infection (Brief idea about Pre-penetration, Penetration and Post-penetration), 2.2. Pathotoxin (Definition,criteria and example), 2.3. Defense mechanism with special reference to Phytoalexin, 2.4. Resistance- Systemic acquired and Induced systemic.	Ms. A. Chaterjee	July, 2018	
CCH 02		3. Plant Disease Management : 3.1. Quarantine, 3.2. Chemical, 3.3. Biological, 3.4. Integrated.	Mr. S. Raha	Nov, 2018	
CCH 02		4. Symptoms , Causal organism, Disease cycle and Control measures of: 4.1. Late blight of Potato, 4.2. Brown spot of rice, 4.3. Black stem rust of wheat, 4.4. Stem rot of jute.	Ms. A. Chaterjee	Nov, 2018	
CCH 02					
CCH 02					
CCH 02					
Course Outcome					

2nd Semester Honours Course (Jan 2019 - June 2019) CCH 03 - PLANT ANATOMY-Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 03	ANATOMY	1. Cell wall: 1.1. Ultrastructure & Chemical constituents, 1.2. Plasmodesmata- ultrastructure, 1.3. Concept of Apoplast and Symplast, 1.4. Growth and Thickening of cell wall.	Mr. P. Shaw	Jan, 2019	
CCH 03		2. Stomata: 2.1. Types (Metcalfe and Chalk, Stebbins and Khush)	Mr. P. Shaw	Jan, 2019	
CCH 03		3. Stele: 3.1 Leaf-trace and leaf-gap, 3.2. Stelar types & evolution	Mr. P. Shaw	Jan, 2019	
CCH 03		4. Primary structure of stem and root- Monocot and Dicot. Leaf- dorsiventral and isobilateral.	Mr. P. Shaw	Feb, 2019	
CCH 03		5. Secondary growth: 5.1. Normal (intra- & extra-stelar), 5.2. Anomalous (stem of Bignonia, Boerhavia, Tecoma, Dracaena and root of Tinospora)	Mr. P. Shaw	Feb, 2019	
CCH 03		6. Mechanical tissues and the Principles governing their distribution in plants.	Mr. P. Shaw	March, 2019	
CCH 03		7. Developmental Anatomy: 7.1. Organisation of shoot apex (Tunica–Corpus) and Root apex (Korper-Kappe), 7.2. Plastochrone.	Mr. P. Shaw	March, 2019	
CCH 03		8. Ecological Anatomy: Adaptive anatomical features of 8.1. Hydrophytes, 8.2. Xerophytes.	Mr. P. Shaw	April, 2019	

CCH 03		9. Scope of plant anatomy: application in systematics, forensics and pharmacognosy	Mr. P. Shaw	M ay, 2019	
Course Outcome					

2nd Semester Honours Course (Jan 2019 - June 2019) CCH 04 - ARCHAEGONIATE- Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 04	BRYOPHYTES	1. General Account : 1.1. General characteristics and adaptations to land habit, 1.2. Classification (Strotler and Crandle Strotler, 2009) up to class with diagnostic characters and examples.	Ms. A. Chaterjee	Jan, 2019	
CCH 04		2. Life History: Gametophyte structure and Reproduction, Development and Structure of sporophyte, Spore dispersal in: 2.1. Marchantia, 2.2. Anthoceros, 2.3. Funaria.	Ms. A. Chaterjee	Feb- March, 2019	

CCH 04		3. Phylogeny: 3.1. Unifying features of archaegoniates; transition to land habit, 3.2. Origin of Alternation of Generations (Homologous and Antithetic theory), 3.3. Evolution of Sporophytes (Progressive and Regressive concept), 3.4. Origin of Bryophytes	Ms. A. Chaterjee	April, 2019	
CCH 04		4. Importance : Role of bryophytes in: 4.1. Plant succession, 4.2. Pollution Monitoring, 4.3. Economic importance of bryophytes with special reference to Sphagnum.	Ms. A. Chaterjee	April, 2019	
CCH 04	PTERIDOPHYTES	1. General Account: 1.1. Colonisation and rise of early land plants, 1.2. Classification of vascular plants by Gifford & Foster (1989) upto division (Rhyniophyta to Filicophyta) with diagnostic characters and examples.	Dr. A. Sarkar	Feb-March, 2019	
CCH 04		2. Life History: Sporophyte structure, Reproduction and Structure of gametophyte in 2.1. Psilotum, 2.2. Selaginella, 2.3. Equisetum, 2.4. Pteris.	Dr. A. Sarkar	Feb-March, 2019	
CCH 04		3. Telome concept and its significance in the origin of different groups of Pteridophytes.	Dr. A. Sarkar	Feb-March, 2019	
CCH 04		4. Heterospory and Origin of Seed habit.	Dr. A. Sarkar	Feb-March, 2019	
CCH 04		5. Economic importance as food, medicine and Agriculture.	Dr. A. Sarkar	April, 2019	1
CCH 04	GYMNOSPERMS	1. Classification of vascular plants by Gifford & Foster (1989) upto division (Progymnospermophyta to Gnetophyta) with diagnostic characters and examples.	Mr. S. Raha	Jan, 2019	
CCH 04		2. Progymnosperms : Diagnostic characters of the group, 2.2.Vegetative and reproductive features of Archeopteris, 2.3. Phylogenetic importance.	Mr. S. Raha	Feb, 2019	
CCH 04		3. Life History : Distribution in India; Vegetative and Reproductive structure of sporophyte, Development of gametophyte in : 3.1. Cycas , 3.2. Pinus and 3.3. Gnetum.	Mr. S. Raha	Apri-May, 2019	

CCH 04		4. Economic Importance with reference to Wood, Resins, Essential oils, and Drugs.	Mr. S. Raha	Feb-March, 2019	
CCH 04					
Course Outcome					

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 05 - PALAEOBOTANY AND PALYNOLOGY- Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 05	PALAEOBOTANY & PALYNOLOGY	1. Geological time scale with dominant plant groups through ages.	Dr. A. Sarkar	July, 2019	
CCH 05		2. Plant Fossil: 2.1. Types: Body fossil (Micro- and Megafossils), Trace fossil, Chemical fossil, Index fossil, 2.2. Different modes of preservation (Schopf, 1975), 2.3. Conditions favouring fossilization, 2.4. Nomenclature and Reconstruction, 2.5. Principle of fossil dating (a brief idea), 2.6.Importance of fossil study.	Dr. A. Sarkar	July, 2019	
CCH 05		3. Fossil Pteridophytes: Structural features, Geological distribution and Evolutionary significance of 3.1. Rhynia, 3.2. Lepidodendron (Reconstructed), 3.3. Calamites (Reconstructed).	Dr. A. Sarkar	August, 2019	
CCH 05		4. Fossil gymnosperms: Structural features and Geological distribution of reconstructed genera: 4.1. Lyginopteris, 4.2. Williamsonia, 4.3.Cordaites.	Mr. P. Shaw	July, 2019	

CCH 05		5. Indian Gondwana System - Three fold division with major megafossil assemblages.	Mr. P. Shaw	July, 2019	
CCH 05		6. Palynology: 6.1. Spore and Pollen, 6.2. Pollen aperture types, 6.3. NPC classification (Erdtman). 6.4. Pollen wall- Sporopollenin, Stratification and Ornamentation (sculpturing).	Mr. P. Shaw	August, 2019	
CCH 05		7. Applied Palynology: Basic concepts of: 7.1. Palaeopalynology, 7.2. Aeropalynology, 7.3. Forensic palynology, 7.4. Melissopalynology.	Mr. P. Shaw	August, 2019	
CCH 05					
Course Outcome					

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 06 - REPRODUCTIVE BIOLOGY OF ANGIOSPERMS- The

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 06	MORPHOLOGY OF ANGIOSPERMS	1. Inflorescence types with examples.	Mr. P. Shaw	July, 2019	
CCH 06		2. Flower, induction of flowering, flower development- genetic and molecular aspects.	Mr. P. Shaw	July, 2019	

CCH 06		3. Fruits and seeds - types with examples.	Mr. P. Shaw	August, 2019	
CCH 06	EMBRYOLOGY	1. Pre-fertilisation changes : 1.1. Microsporogenesis and Microgametogenesis, 1.2. Megasporogenesis and Megagametogenesis (monosporic, bisporic and tetrasporic).	Mr. S. Raha	August, 2019	
CCH 06		2. Fertilisation: 2.1. Pollen germination, 2.2. Pollen tube- growth, entry into ovule and discharge, 2.3. Double fertilization.	Mr. S. Raha	Sept, 2019	
CCH 06		3. Post-fertilization changes : 3.1. Embryogenesis in Capsella, 3.2. Development of Endosperm (3 types).	Mr. S. Raha	Sept, 2019	
CCH 06		4. Apomixis & Polyembryony: 4.1. Apomixis- Apospory and Apogamy, 4.2.Polyembryony- different types.	Mr. S. Raha	Nov, 2019	
CCH 06					
Course Outcome					

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 07 - PLANT SYSTEMATICS- Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes

CCH 07	TAXONOMY OF ANGIOSPERMS	1. Introduction: 1.1. Components of Systematic: Nomenclature, Identification, Classification; 1.2. Taxonomy and its phases - Pioneer, Consolidation, Biosystematic and Encyclopaedic; alpha- and omega- taxonomy.	Mr. P. Shaw	July, 2019	
CCH 07		2. Nomenclature: Type method, Publication, Rank of taxa, Rules of priority, Retention and rejection of names, Author Citation, Effective and valid publication, Elementary knowledge of ICN- Principles.	Mr. P. Shaw	July, 2019	
CCH 07		3. Systems of classification: Broad outline of Bentham & Hooker (1862-1883), Cronquist (1988), Takhatajan (1991) - system of classification with merits and demerits. Brief reference of angiosperm phylogeny group (APG III) classification.	Mr. P. Shaw	August, 2019	
CCH 07		3.1. Systematics in Practice: Herbaria and Botanical Gardens – their role in teaching and research; important Herbaria and Botanical Gardens of India and world (3 each); 3.2. Dichotomous keys – indented and bracketed.	Mr. P. Shaw	August, 2019	
CCH 07		4. Phenetics and Cladistics: Brief idea on Phenetics, Numerical taxonomy- methods and significance; Cladistics- construction of dendrogram and primary analysis; Monophyletic, polyphyletic and paraphyletic groups; Plesiomorphy and apomorphy.	Mr. P. Shaw	Sept, 2019	
CCH 07		5. Data sources in Taxonomy: Supportive evidences from: 5.1. Phytochemistry, 5.2. Cytology, 5.3. Palynology and 5.4. Molecular biology data (Protein and Nucleic acid homology).	Mr. P. Shaw	Sept, 2019	

CCH 07		6. Diagnostic features, Systematic position (Bentham & Hooker and Cronquist), Economically important plants (parts used and uses) of the following families: 6.1. Monocotyledons: Alismataceae, Gramineae (Poaceae), Cyperaceae, Palmae (Arecaceae), Liliaceae, Musaceae, Zingiberaceae, Cannaceae, Orchidaceae. 6.2. Dicotyledons: Nymphaeaceae, Magnoliaceae, Leguminosae (subfamilies), Polygonaceae, Euphorbiaceae, Malvaceae, Umbelliferae (Apiaceae), Labiatae (Lamiaceae), Solanaceae, Scrophulariaceae, Acanthaceae, Rubiaceae, Cucurbitaceae, Compositae (Asteraceae).	Mr. P. Shaw	July-Nov, 2019	
CCH 07					
Course Outcome					

3rd Semester Honours Course (July 2019 - Dec 2019) SEC A- APPLIED PHYCOLOGY, MYCOLOGY AND MICROBIOL SEC-A-3-1)- Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
SEC	APPLIED PHYCOLOGY	1. Algae as food and source of phycocolloid (Agar-agar, Algin, Carrageenan), 2. Diatomite, 3. Algal toxin, 4. Algal Biotechnology – potential of microalgae for SCP, β-carotene, Biodiesel, bioplastics from algae.	Dr. A. Sarkar + Mr. S. Raha	July-Aug, 2019	

SEC	APPLIED MYCOLOGY	1. Fungi as food, 2. Cheese and Ethanol- Industrial production (brief outline), 3. Fungal sources and uses of Enzyme (Cellulase), Amino acid (Tryptophan), Vitamin (Riboflavin), Antibiotic (Griseofulvin), Pharmaceuticals (Cyclosporin-A). 4. Aflatoxin	Mr. P. Shaw	July-Aug, 2019	
SEC	APPLIED MICROBIOLOGY	1. Industrial Production of Vinegar and Streptomycin (brief outline), 2. Microbial sources and uses of Enzyme (Amylase, Protease), Amino acid (Glutamic acid, Lysine), Polysaccharides (Dextran), 3. Use of microbes as Biofertilizer and Biopesticides, 3.4. Use of microbes in mineral processing.	Dr. A. Sarkar + Ms. A. Chaterjee	Aug-Nov, 2019	
SEC					
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Course Outcome					

4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 08 - PLANT GEOGRAPHY, ECOLOGY AND EVOLUTION- T

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 08	PLANT GEOGRAPHY	1. Phytogeographical regions: 1.1. Phytogeographical regions of India (Chatterjee 1960); 1.2. Dominant flora of Eastern Himalaya, Western Himalaya and Sunderban.	Mr. S. Raha	April-May, 2020	
CCH 08		2. Endemism: 2.1 Endemic types and Factors; 2.2. Age & Area hypothesis and Epibiotic theory; 2.3. Endemism in Indian flora.	Mr. S. Raha	April-May, 2020	
CCH 08	ECOLOGY	1. Preliminary idea on: 1.1. Habitat and Niche, 1.2. Ecotone and edge–effect, 1.3. Microclimate, 1.4. Ecads, ecotype and ecoclines, 1.5. Carrying capacity.	Mr. S. Raha	Feb-March, 2023	
CCH 08		2. Community ecology: 2.1. Community- Characteristics and diversity, 2.2. Ecological succession –Primary and secondary, Seral stages (with reference to Hydrosere), autogenic and allogenic succession.	Mr. S. Raha	April-May, 2020	
CCH 08		3.1. Plant indicators (metallophytes); 3.2. Phytoremediation.	Mr. S. Raha	Feb-March, 2020	
CCH 08		4. Conservation of Biodiversity: 4.1. Level of Biodiversity: genetic, species & ecosystem diversity, 4.2. Biodiversity hot spots- criteriaIndian hotspots, 4.3. In- situ and ex-situ conservation, 4.4. Seed-banks, 4.5. Cryopreservation	Mr. S. Raha	Feb-March, 2020	

CCH 08	EVOLUTION	1.1 Introduction, 1.2. Theories of evolution: Natural selection, Group selection, Neutral theory of molecular evolution, 1.3. Phyletic gradualism, Punctuated equilibrium and Stasis	Mr. P. Shaw	April-M ay, 2020	
CCH 08		2.1 Brief idea on: Stabilizing directional, disruptive and sexual selection; Speciation: Sympatric and allopatric speciation; Coevolution, Adaptive radiation, Reproductive isolation 3.1. Simplified phylogeny of bacteria, algae, fungi, bryophyte, pteridophyte and gymnosperm, 3.2. Phylogenetic tree.	Mr. P. Shaw	April-M ay, 2020	
Course Outcome					

4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 09 - ECONOMIC BOTANY-Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
CCH 09		1. Origin of cultivated crops: Concepts of centre of origin, their importance with reference to Vavilov's work. Examples of major plant introductions; crop domestication and loss of genetic diversity; evolution of new crops/ varieties, importance of germplasm diversity.	DR. S. Sonkar	Feb-March, 2023	
CCH 09		2. Cereals: Rice and wheat (origin, morphology, processing and uses).	Mr. S. Raha	April-May, 2020	

CCH 09		3. Legumes: Origin, morphology and uses of gram and mung bean. Importance to man and environment.	DR. S. Sonkar	May, 2020	4
CCH 09		4. Sugar and starches: Morphology and processing of sugarcane, products and byproducts of sugarcane industry. Potato- morphology, propagation and uses.	DR. S. Sonkar	April-M ay, 2020	
CCH 09		5. Spices: Listing of important spices, their family and part used.	Mr. P. Shaw	April-M ay, 2020	
CCH 09		6. Beverages: Tea (morphology, processing and uses).	Mr. P. Shaw	April-M ay, 2020	
CCH 09		7. Oil and fats: General description, classification, extraction, their uses and health implications of mustard, soybean, coconut (Botanical name, family and uses). Essential oils- general account, extraction methods, comparison with fatty oils and their uses.	Mr. P. Shaw	April-M ay, 2020	
CCH 09		8. Drug-yielding plants: Therapeutic and habit forming drugs with special reference to Cinchona, Digitalis, Papavar, Cannabis and Tobacco (morphology, processing, uses and health hazards).	Ms. A. Chaterjee	April-M ay, 2020	
CCH 09		9. Timber: general account with special reference to Sal and Teak.	Ms. A. Chaterjee	April-M ay, 2020	
CCH 09		10. Fibers: Cotton and Jute (Morphology, extraction and uses).	Mr. S. Raha	April-May, 2020	
CCH 09					

Course Outcome					
4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 10 - GENETICS- Theory					
Name of the paper	**Module or Unit No**	**Topic**	**Name of the teacher**	**To be Completed during**	**No of PPT classes**
CCH 10		1. Introduction: Mendelian genetics and its extension	Ms. A. Chaterjee	April, 2020	
CCH 10		2. Linkage, Crossing over and Gene Mapping: 2.1.Complete and incomplete linkage (example), linked gene does not assort independently (example), linkage group, 2.2. Crossing over, crossing over produces recombination (example), detection of crossing over (McClintock's experiment), and 2.3.Molecular mechanism of crossing over (Holliday model), 2.4. Gene mapping with three point test cross, detection of middle gene in three point test cross, calculation of recombination frequencies, 2.5. Co-efficient of coincidence and interference, mapping function, 2.6. Problems on gene mapping, 2.7. Molecular mapping – ISH, FISH (brief idea).	Ms. A. Chaterjee	April, 2020	
CCH 10		3. Epistasis and Polygenic inheritance in plants.	Ms. A. Chaterjee	April, 2020	

CCH 10		4. Aneuploidy and Polyploidy: Types, examples, meiotic behaviour and importance of: 4.1. Aneuploidy, 4.2. Polyploidy, 4.3. Speciation and evolution through polyploidy.	Ms. A. Chaterjee	April, 2020	
CCH 10		5. Chromosomal aberration: Types and meiotic behaviour of: 5.1. Deletion, 5.2. Duplication, 5.3. Translocation, and 5.4. Inversion.	Ms. A. Chaterjee	April, 2020	
CCH 10		6. Mutation : 6.1. Point mutation-Transition, Transversion and Frame shift mutation, 6.2. Molecular mechanisms (tautomerisation, alkylation, deamination, base analogue incorporation, dimerisation), 6.3. DNA repair (brief idea).	Ms. A. Chaterjee	April, 2020	
CCH 10		7. Structural organisation of Gene: 7.1. One Gene–one polypeptide concept, 7.2. Split gene, 7.3. Overlapping gene, 7.4. Repetitive DNAtandem and interspersed, 7.5. Transposon (Ac-Ds system), 7.6. Homoeotic gene in plants (ABCE Quartet model of flowering).	Ms. A. Chaterjee	April, 2020	
CCH 10					
Course Outcome					

4th Semester Honours Course (Jan 2020 - Jun 2020) SEC B -PLANT BREEDING-Theory

Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during	No of PPT classes
SEC		1. Plant breeding: introduction and objectives, breeding systems-modes of reproduction in crop plants, important achievements and undesirable consequence of plant breeding.	DR. S. Sonkar	Feb-March, 2020	
SEC		Methods of crop improvement: Introduction- centres of origin and domestication of crop plants, plant genetics resources; acclimatization, selection methods- for self pollination, cross pollinated and vegetatively propagated plants, hybridization-for self, cross and vegetatively propagated plants, procedure, advantages and limitations.	DR. S. Sonkar	April-May, 2020	
SEC		Maintenance of germplasm, 3.1. Mass selections and Pure line selection, 3.2. Back cross method.	DR. S. Sonkar	April-May, 2020	
SEC		Heterosis and hybrid seed production, 4.1. Male sterility and its use in plant breeding.	DR. S. Sonkar	Feb-March, 2020	
SEC		Inbreeding and inbreeding depression, effect of outcrossing- a very brief idea.	DR. S. Sonkar	Feb-March, 2020	
SEC		Molecular Breeding (use of DNA markers in plant breeding).	DR. S. Sonkar	April-May, 2020	
SEC		Role of mutations, polyploidy, distant hybridization and role of biotechnology in crop improvements.	DR. S. Sonkar	April-May, 2020	

Course Outcome	SEC

1st Semester Honours Course (July 2018 - Dec 2018) CCH 01 - Phycology and Microbiology -P

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 01	ALGAE	1. Work out of the following algae with reproductive structure (Free hand drawing and drawing under drawing prism with magnification): Oedogonium, Chara, Ectocarpus.	Dr. A. Sarkar + Mr. S. Raha	July-Aug, 2018
	CCH 01		2. Study of (a) Permanent slides : Gloeotrichia, Volvox, Vaucheria, Coleochaete, Polysiphonia, Centric and Pennate diatom; (b) Macroscopic specimens : Laminaria, Sargassum.	Dr. A. Sarkar + Mr. S. Raha	July-Aug, 2019
	CCH 01	MICROBIOLOGY	1. Preparation of bacterial media – (a) Nutrient agar and nutrient broth, (b) Preparation of slants and pouring Petri-plates.	Ms. A. Chaterjee	July, 2018
	CCH 01		2. Sub-culturing of bacterial culture.	Ms. A. Chaterjee	July, 2018
	CCH 01		3. Gram staining from bacterial culture.	Ms. A. Chaterjee	Aug, 2018

	CCH 01		4. Microscopic examination of bacteria from natural habitat (curd) by simple staining.	Ms. A. Chaterjee	Aug, 2018
	CCH 01	FIELD WORK	At least one local excursion to be conducted for study and collection of algae (only 5 from natural habitat) and another local excursion should be conducted to give an introductory idea about plant diversity (Collection not required).	Mr. P. Shaw+ Mr. S. Raha	Sept, 2018
	CCH 01				
	Course Outcome				

1st Semester Honours Course (July 2018 - Dec 2018) CCH 02 - Mycology and Phytopathology-

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during

	CCH 02	MYCOLOGY	1. Work out of the following fungi with reproductive structures (including microscopic measurement of Reproductive structures): Rhizopus (asexual), Ascobolus , Agaricus .	Mr. P. Shaw + Mr. S. Raha	July-Aug, 2018
	CCH 02		2. Study from permanent slides: Zygospore of Rhizopus, Conidia of Fusarium,Conidiophore of Penicillium. 3. Morphological study of Fungi (fruit body of Polyporus, Cyathus), Lichens (fruticose and foliose).	Mr. P. Shaw + Mr. S. Raha	Aug-Sept, 2018
	CCH 02	PHYTO- PATHOLOGY	1. Preparation of fungal media (PDA).	Ms. A. Chaterjee	July, 2018
	CCH 02		2. Sterilization process.	Ms. A. Chaterjee	July, 2018
	CCH 02		3. Isolation of pathogen from diseased leaf.	Ms. A. Chaterjee	Aug, 2018
	CCH 02		4. Inoculation of fruit and subculturing.	Ms. A. Chaterjee	Sept, 2018

	CCH 02		5. Identification : Pathological specimens of Brown spot of rice, Bacterial blight of rice , Loose smut of wheat, Stem rot of jute, Late blight of potato; Slides of uredial, telial, pycnial & aecial stages of Puccinia graminis.	Ms. A. Chaterjee	Sept, 2018
	CCH 02	FIELD WORK	At least one local excursion to be conducted for study and collection of macrofungi (only 5).	Mr. P. Shaw + Mr. S. Raha	Sept, 2018
	CCH 02				
	CCH 02				
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	CCH 02				
	Course Outcome				
	2nd Semester Honours Course (Jan 2019 - June 2019) CCH 03 - PLANT ANATOMY- Practical				

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 03	PLANT ANATOMY	1. Microscopic studies on: Types of stomata, sclereids, raphides (Colocasia), cystolith (Ficus leaf) starch grains, aleurone grains, laticiferous ducts, oil glands.	Dr. A. Sarkar	Feb-March, 2019
	CCH 03		2. Study of anatomical details through permanent slides/ temporary stained mounts- a) Root- Monocot and dicot, b) Stem- Monocot and dicot, c) Leaf- Monocot and dicot.	Dr. A. Sarkar	Feb-March, 2019
	CCH 03		3. Study of anomalous secondary structure in stem of Bignonia, Boerhaavia, Tecoma, Dracaena and root of Tinospora	Dr. A. Sarkar	Feb-March, 2019
	CCH 03		4. Study of adaptive anatomical features: Hydrophytes (Nymphaea – petiole) and Xerophytes (Nerium – leaf).	Dr. A. Sarkar	Feb-March, 2019
	CCH 03				
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	CCH 03				
	Course Outcome				

2nd Semester Honours Course (Jan 2019 - June 2019) CCH 04 - ARCHAEGONIATE- Practical

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 04	BRYOPHYTES	1. Morphological study of the plant body: Genera as mentioned in theoretical syllabus and Riccia, Porella. 2. Study from permanent slides : Riccia (V.S. of thallus with sporophyte), Marchantia (L.S. through gemma cup, antheridiophore , archegoniophore) , Anthoceros (L.S. of sporophyte) , Funaria (L.S. of capsule).	Ms. A. Chaterjee	Feb-March, 2019
	CCH 04	PTERIDOPHYTES	1. Morphological study of the sporophytic plant body: Genera as mentioned in the theoretical syllabus and Lycopodium, Ophioglossum and Marsilea. 2. Workout of the reproductive structures: Selaginella, Equisetum, Pteris. 3. Study from permanent slides: Psilotum (T.S. of synangium), Lycopodium (L.S. of strobilus), Ophioglossum (L.S. of spike), Dryopteris (gametophyte), Marsilea (L.S. of sporocarp).	Dr. A. Sarkar	April and May, 2019

CCH 04	GYMNOSPERMS	1. Morphological study: Cycas (microsporophyll and megasporophyll), Pinus (female and male cone), Gnetum (female and male cone). 2. Study from permanent slides: Cycas (L.S. of ovule), Pinus (L.S. of male and female cone), Ginkgo (L.S. of female strobilus), Gnetum (L.S. of male cone and ovule).	Mr. S. Raha	April and May, 2019
CCH 04	FIELD STUDY	Botanical excursion to familiarize the students with the natural habitats of these groups is desirable. No individual collection should be allowed. Students should submit only photographs in their field report	Dr. A. Sarkar	April and May, 2019
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CCH 04				

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 05 - PALAEOBOTANY AND PALYNO

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 05	PALAEOBOTANY & PALYNOLOGY	1. Morphological study: Ptilophyllum and Glossopteris leaf fossils.	Ms. A. Chaterjee	Aug, 2019
	CCH 05		2. Study from permanent slides: T.S. of stem of Rhynia, Lepidodendron, Calamites, Lyginopteris, Cordaites.	Ms. A. Chaterjee	Sept, 2019
	CCH 05		3. Study of Pollen types (colpate, porate and colporate) from permanent slides. Slides may be prepared from specimens: Colpate (Leonurus sibiricus/ Brassica sp.), Porate (Hibiscus rosa-sinensis), Colporate (Cassia sophera/ C. tora).	Mr. P. Shaw	Nov, 2019
	CCH 05				

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Course Outcome				

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3rd Semester Honours Course (July 2019 - Dec 2019) CCH 06 - REPRODUCTIVE BIOLOGY OF A

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 06	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS	1. Inflorescence types- study from fresh/ preserved specimens	Mr. P. Shaw	July, 2019
	CCH 06		2. Flowers- study of different types from fresh/ preserved specimens	Mr. P. Shaw	August, 2019

	CCH 06		3. Fruits- study from different types from fresh/preserved specimens	Mr. P. Shaw	August, 2019
	CCH 06		4. Study of ovules (permanent slides/ specimens/photographs)- types (anatropous, orthotropous, amphitropous and campylotropous)	Mr. P. Shaw	Sept, 2019
	CCH 06		5. Field study desirable	Mr. P. Shaw	Nov, 2019
	CCH 06				
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	CCH 06				
	Course Outcome				

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 07 - PLANT SYSTEMATICS- Practica

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during

	CCH 07	ANGIOSPERMS	1. Work out, description, preparation of floral formula and floral diagram, identification up to genus with the help of suitable literature of wild plants and systematic position according to Benthum Hooker system of classification from the following families: Malvaceae, Fabaceae (Papilionaceae), Solanaceae, Scrophulariaceae, Acanthaceae, Labiatae (Lamiaceae), Rubiaceae.	Mr. P. Shaw	July-Nov, 2019
	CCH 07		2. Spot identification (Binomial, Family) of common wild plants from families included in the theoretical syllabus (list to be provided).	Mr. P. Shaw	July-Nov, 2019
	CCH 07	FIELD WORK	At least three excursions including one excursion to Acharya Jagadish Chandra Bose Indian Botanic Garden (Shibpur, Howrah) and Central National Herbarium (CNH).	Dr. A. Sarkar + Mr. P. Shaw + Mr. S. Raha	July-Nov, 2019
	CCH 07				
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	CCH 07				

	CCH 07				
	CCH 07				
	Course Outcome				

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3rd Semester Honours Course (July 2019 - Dec 2019) SEC

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
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	Course Outcome				
Theory	4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 08 - PLANT GEOGRAPHY, ECOLOGY A Practical				

Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 08	PLANT GEOGRAPHY	1. Field visit- at least one long excursion at different phytogeographical region of India. 2. Study of local flora and submission of a project report highlighting phytogeographical characteristics of the region.	DR. S. Sonkar	April-May, 2020
	CCH 08	ECOLOGY	1. Study of community structure by quadrat method and determination of (i) Minimal size of the quadrat, (ii) Frequency, density and abundance of components (to be done during excursion/ field visit).	DR. S. Sonkar	April-May, 2020
	CCH 08		2. Comparative anatomical studies of leaves form polluted and less polluted areas.	DR. S. Sonkar	Feb-March, 2020
	CCH 08		3. Measurement of dissolved O2 by azide modification of Winkler's method.	DR. S. Sonkar	April-May, 2020
	CCH 08		4. Comparison of free CO2 from different sources.	DR. S. Sonkar	April-May, 2020
	CCH 08				

	CCH 08				
	CCH 08				
	Course Outcome				

4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 09 - ECONOMIC BOTANY- Practical

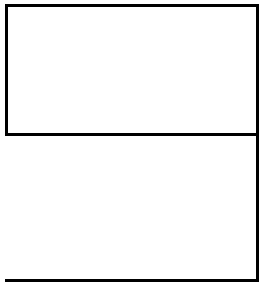
Continuous Internal Assesment Schedule (write yes or no)	Name of the paper	Module or Unit No	Topic	Name of the teacher	To be Completed during
	CCH 09	ECONOMIC BOTANY	1. Cereals: Wheat (habit sketch, L.S./T.S. of grain, starch grains, micro-chemical tests); rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests)	DR. S. Sonkar	April-May, 2020
	CCH 09		Legume: Soybean, ground nut (habit, fruit, seed structure, micro-chemical tests)	DR. S. Sonkar	April-May, 2020

	CCH 09		Source of sugars and starches: Sugarcane (habit sketch; cane juice- micro-chemical tests); potato (habit sketch, tuber morphology, T.S. of tuber to show localization of starch grains, W.M. of starch grains, micro-chemical tests.	DR. S. Sonkar	April-May, 2020
	CCH 09		4. Tea- tea leaves, tests for tannin	DR. S. Sonkar	Feb-March, 2023
	CCH 09		5. Mustard- plant specimen, seeds, tests for fat in crushed seeds	DR. S. Sonkar	April-May, 2020
	CCH 09		6. Habit sketch of Digitalis, Papaver and Cannabis.	DR. S. Sonkar	Feb-March, 2023
	CCH 09		7. Sal, Teak- section of young stem.	DR. S. Sonkar	Feb-March, 2020
	CCH 09		Jute- specimen, transverse section of stem, tests for lignin on T.S. of stem and study of fibre following maceration technique.	DR. S. Sonkar	April-May, 2020
	CCH 09				
	CCH 09				
	CCH 09				

Continuous Internal Assesment Schedule (write yes or no)	Course Outcome				
	4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 10 - GENETICS- Practical				
	Name of the paper	**Module or Unit No**	**Topic**	**Name of the teacher**	**To be Completed during**
	CCH 10		1. Introduction to chromosome preparation: Pre-treatment, Fixation, Staining, Squash and Smear preparation, Preparation of permanent slides.	Ms. A. Chaterjee	April-May, 2020
	CCH 10		2. Determination of mitotic index and frequency of different mitotic stages in pre-fixed root tips of Allium cepa.	Ms. A. Chaterjee	April-May, 2020
	CCH 10		3. Study of mitotic chromosome: Metaphase chromosome preparation, free hand drawing under high power objective, drawing with drawing prism under oil immersion lens, determination of 2n number, and comment on chromosome morphology of the following specimens from root tips: Allium cepa, Aloe vera, Lens esculenta.	Ms. A. Chaterjee	April-May, 2020

	CCH 10		4. Study of chromosomal aberrations developed due to exposure to any two pollutants/ pesticides etc.	Ms. A. Chaterjee	April-May, 2020
	CCH 10		5. Study of meiotic chromosome: Smear preparation of meiotic cells, identification of different stages and free hand drawing of the following specimens from flower buds: Allium cepa and Setcreasea sp.	Ms. A. Chaterjee	April-May, 2020
	CCH 10		6. Identification from permanent slides : Meiosis – (i) normal stages (ii) abnormal stages – laggard, anaphase bridge, ring chromosome (Rhoeo discolor); Mitosis – (i) normal stages, (ii) abnormal stagesearly separation, late separation, multipolarity, sticky bridge, laggard, fragmentation, (ii) pollen mitosis.	Ms. A. Chaterjee	April-May, 2020
	CCH 10				
	CCH 10				
	Course Outcome				

Continuous Internal Assesment Schedule (write yes or no)



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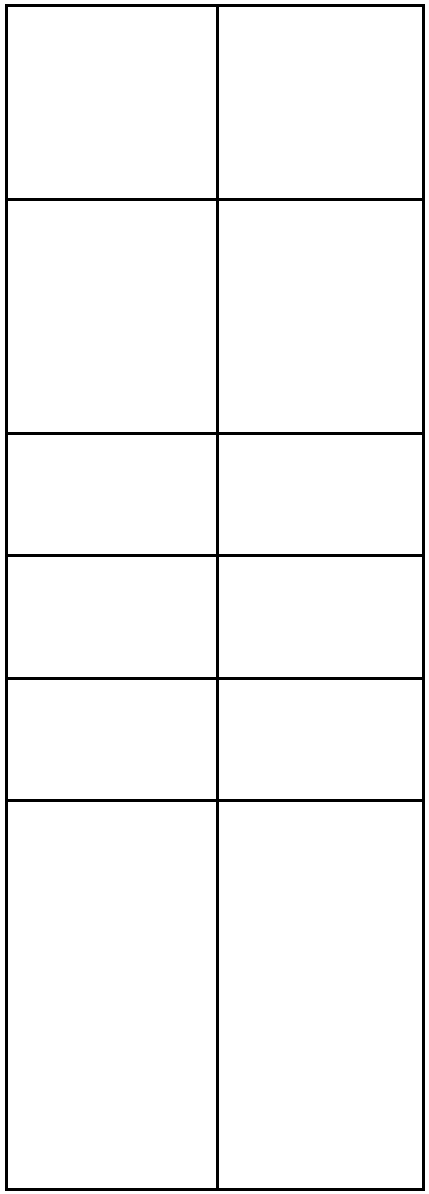
No of PPT classes	**Continuous Internal Assesment Schedule (write yes or no)**



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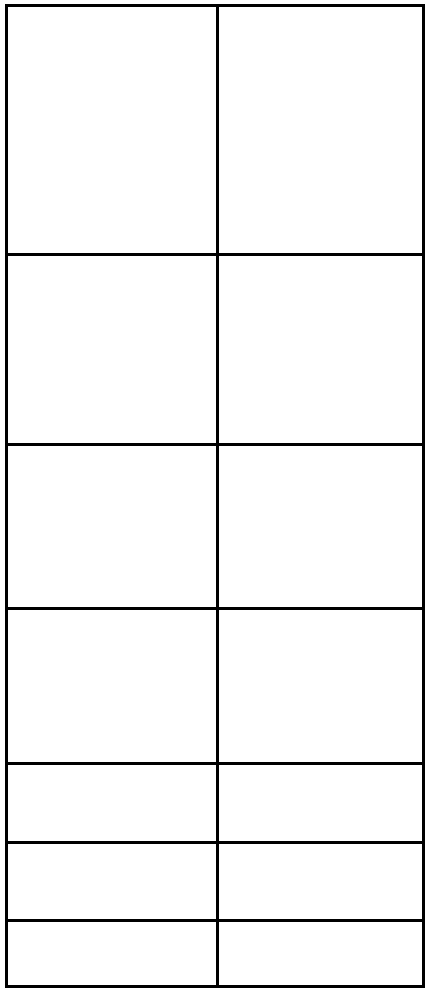
No of Practical classes	**Continuous Internal Assesment Schedule (write yes or**



LOGY- Practical	
No of PPT classes	**Continuous Internal Assesment Schedule (write yes or no)**

ANGIOSPERMS- Practical	
No of PPT classes	**Continuous Internal Assesment Schedule (write yes or no)**

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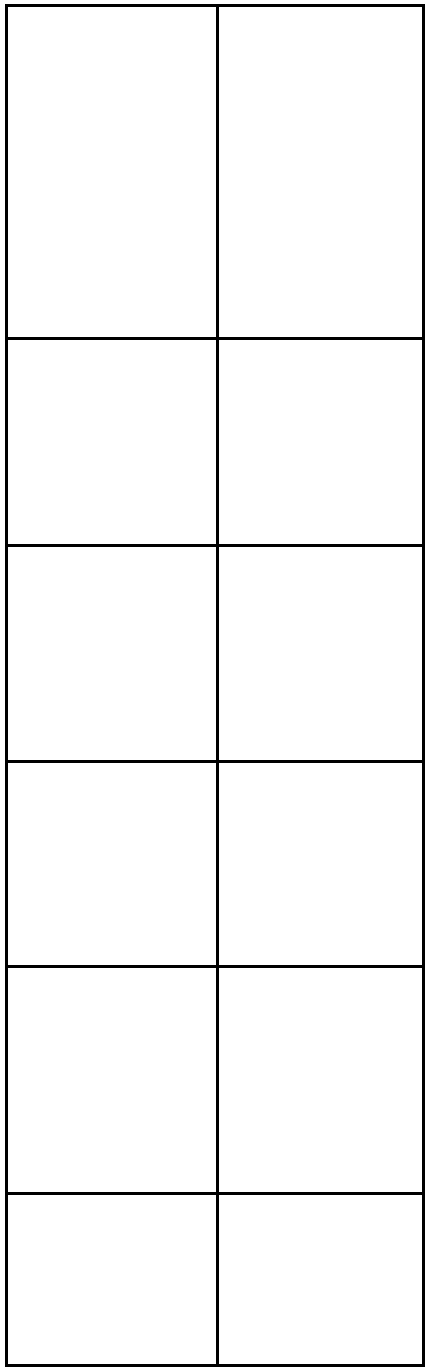

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No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)

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No of PPT classes	**Continuous Internal Assesment Schedule (write yes or no)**