# TEACHING PLAN

2023-2024

*SUBMITTED BY-*

DR. EUSHAH ALI

ASSISTANT PROFESSOR,

P. G. DEPARTMENT OF BOTANY,

MADHAB CHOUDHURY COLLEGE,

BARPETA, ASSAM

**MADHAB CHOUDHURY COLLEGE, BARPETA**

TEACHING PLAN

SESSION: 2023-24

**ODD SEMESTER CLASSES:**

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| NAME OF THE TEACHER: | **Dr. Eushah Ali** | |
| DEPARTMENT | Botany | |
| DESIGNATION: | Assistant Professor (Sr. Grade) | |
| COURSE: | **Higher Secondary 2nd Year** | |
| PAPER NAME: | Biology (Botany) | |
| PAPER CREDIT: | 70 (35) | |
| PAPER CODE: | | |
| UNIT/ TOPIC | MARKS ASSIGNED: | 7 |
| **THEORY**:<br>1. Microbes in Human welfare-Fermented Food, Beverages, Antibiotic, Biofertilizers, Biogas, Bioinsecticides, Biopesticides and Sewage water Treatment.<br>**PRACTICAL:**<br>Unit: 1, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15<br>Topics:<br>1. Study of the reproductive parts of different flowers.<br>2. To study mitosis in onion root tips.<br>3. To study meiosis in onion buds.<br>4. Exercise on controlled pollination – emasculation, bagging and tagging.<br>5. To study $P^H$ and water holding capacity of soil.<br>6. Study of plants found in dry conditions.<br>7. Study of plants found in aquatic conditions.<br>8. Study of plant population density by quadrat method.<br>9. Study of plant population frequency by quadrat method.<br>10. To study analogous and homologous organs in various plants.<br>1. Preparation of practical record book. | TENTATIVE DATES | **Year: 2023**<br>August: 4, 11, 18, 25(2), =05<br>September: 1(2), 8(2), 15(2), 22(2), 29(2)=10<br>October: 6, 13(2)=03<br>November: 3, 10(2), 17=04<br>December: 1, 8, 15, 22, 29=05 |
| | NUMBER OF CLASSES | 27 |
| | LEARNING OUTCOMES | Students will know about microorganisms, uses and activities of microbes in the production of different useful products which are used in our daily life. Students will know the environmental pollution and minimize the pollution by using different types of microbes. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test |
| | RESOURCE/ MATERIALS | 1. Field study<br>2. ICT, White Board based classes |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment |
| | REFLECTION | |
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| COURSE: | **FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP-1st Semester)** | |
| PAPER NAME: | Plant and Microbial Diversity | |
| PAPER CREDIT: | 03+01=04 (Theory=03, Practical=01) | |
| PAPER CODE: | 100-199 | |
| UNIT/ TOPIC: | MARKS ASSIGNED: | Theory: 60<br>Practical: 25<br>Internal Assessment: 15 |
| **Unit 2: Bacteria and Viruses:** Bacteria: General features, cell structure, reproduction, conjugation, transformation, and transduction; introduction to Archaebacteria.<br>**Viruses**: General features, replication, reproduction (Lytic and Lysogenic life cycles), RNA virus (TMV), DNA virus (Cauliflower Mosaic Virus).<br><br>**Practicals:**<br>1. Study of structure of TMV and Bacteriophage (electron micrographs/models).<br>2. Study of *Mucor*, *Ascobolus, Agaricus* (Temporary preparation of slides) | TENTATIVE DATES | August:8, 10, 11, 17, 22, 24, 25, 29, 31=09<br>September: 5, 7, 8, 12, 14, 15, 19, 21, 22, 26, 28, 29=13<br>October: 3, 5, 6, 10, 12, 13, 31=07<br>November: 2, 3, 7, 9, 10, 14, 16, 17, 21, 22, 23, 25, 28, 29, 30=15<br>December: 1, 4, 5, 6, 7, 8, 9=7 |
| | NUMBER OF CLASSES | 51 |
| | LEARNING OUTCOMES | 1. Basic understanding of the characteristics, distribution, classification, reproduction and current status of various microbial communities.<br>2. Good understanding of virus, bacteria and their importance to human welfare.<br>3. Knowledge to identify virus, bacteria and fungi in the laboratory through morphological and reproductive analysis. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test<br>4. Quiz<br>5. Group discussion |
| | RESOURCE/ MATERIALS | 1. Field study<br>2. ICT, Black board/White board based classes<br>3. Teaching through photographs, charts and models. |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Field study<br>5. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | B. **Sc 1st semester (FYUGP), SEC (Botany)** | |
| PAPER NAME: | Nursery & Gardening | |
| PAPER CREDIT: | 02+01=03 (Theory=02, Practical=01) | |
| PAPER CODE: | SEC0106803 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 30<br>Practical: 25<br>Internal Assessment: 20 |
| **Unit 3:** Vegetative propagation: air- | TENTATIVE | September: 2, 9, 16(2), 23, 30(2)=07 |

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| layering, cutting and grafting, selection of Cuttings, collecting season, treatment of Cuttings, rooting medium and planting of Cuttings; hardening of plants, green house, shade house and glass house.<br>**Practicals**:<br>1. Cutting, Layering and Grafting techniques<br>2. Field visit to different Nursery and Gardens. | DATES | October: 7, 14=02<br>November: 4(2), 11, 18, 25=05 |
| | NUMBER OF CLASSES | 14 |
| | LEARNING OUTCOMES | 1. Students will develop entrepreneurship skill through establishing their own Nursery Units.<br>2. Acquire skills for production, maintenance and propagation techniques of different horticulturally important plants.<br>3. Acquire skills to establish and maintain different types of Gardens. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test<br>4. Group discussion<br>5. Field study |
| | RESOURCE/ MATERIALS | 1. Visit to Nursery & Garden<br>2. ICT, Black board/White board based classes<br>3. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Field study<br>5. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 3rd Semester (Honours)-CBCS** | |
| PAPER NAME: | Economic Botany | |
| PAPER CREDIT: | Theory Credit: 04<br>Practical Credit: 02 | |
| PAPER CODE: | BOT-HC-3026 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 60<br>Practical: 20<br>Internal Assessment: 20 |
| Unit 2: Cereals (6 lectures) Wheat and Rice (origin, morphology, processing & uses); Brief account of millets.<br><br>Unit 3: Legumes (6 lectures) Origin, morphology and uses of Chick pea, Pigeon pea and fodder legumes; importance to man and ecosystem.<br>**Practicals**:<br>**Cereals**: Study of useful parts: Rice/Bean (habit sketch, study of paddy and grain, starch grain, micro-chemical test)<br>**Legumes**: Bean, Groundnut, (habit, fruit, seed structure, micro-chemical tests). | TENTATIVE DATES | August: 3, 10, 17, 24, 31=05<br>September: 7, 14, 21(2), 28(2)=06<br>October: 5(2), 12=03<br>November: 2, 9, 16, 23, 30=05 |
| | NUMBER OF CLASSES | 19 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the origin, morphological characters, how to process wheat, rice, chick pea, pigeon pea and fodder legumes and their various aspects of importance to man and ecosystem.<br>2. Students will know the cultivation process of of wheat, rice, chick pea, pigeon pea and fodder legumes. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment |

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| | | 3. Class test |
| | RESOURCE/ MATERIALS | 1. ICT, Black board/White board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 3rd Semester (SEC)-CBCS** | |
| PAPER NAME: | Botany SEC (Biofertilizers), SEC-1 | |
| PAPER CREDIT: | Theory Credit: 04<br>Practical Credit: 02 | |
| PAPER CODE: | BOT-SE-3014 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 50<br>Practical: 50 |
| **Unit 1 :** General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.<br>**Unit 2 :** *Azospirillum:* isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms.*Azotobacter*: classification, characteristics – crop response to *Azotobacter* inoculum, maintenance and mass multiplication. | TENTATIVE DATES | August: 3, 10, 17, 24, 31=05<br>September: 7, 14, 21, 28=04<br>October: 5, 12=02<br>November: 2, 9, 16, 23, 30=05 |
| | NUMBER OF CLASSES | 16 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the different microbes use as biofertilizers, substitutes as chemical fertilizers and environmental pollution. They will also know about the morphological and associative characters of the different microbes with other plants and aware the uses of biofertilizers in the production of different crops plants.<br>2. Practically students will know the mass cultivation of *Rhizobium, Azospirillum* and *Azotobacter* bacteria in artificial laboratory conditions. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test |
| | RESOURCE/ MATERIALS | 2. ICT, Black board/White board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 5th Semester (Honours)-CBCS** | |
| PAPER NAME: | **Horticultural Practices and Post-Harvest Technology** | |

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| PAPER CREDIT: | Theory Credit: 04<br>Practical Credit: 02 | |
| PAPER CODE: | BOT-HE-5026 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 60<br>Practical: 20<br>Internal Assessment: 20 |
| Unit 4 : Horticultural techniques- Application of manure, fertilizers, nutrients and PGRs; Weed control; Biofertilizers, biopesticides; Irrigation methods (drip irrigation, surface irrigation, furrow and border irrigation); Hydroponics; Propagation Methods: asexual (grafting, cutting, layering, budding), sexual (seed propagation), Scope and limitations.<br>Unit 8 : Disease control and management:- Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures and nutritional management practices; Crop sanitation; IPM strategies (genetic, biological and chemical methods for pest control); Quarantine practices; Identification of common diseases and pests of ornamental, fruits and vegetable crops.<br>Unit 9: Horticultural crops- conservation and management: - Documentation and conservation of germplasm; Role of micropropagation and tissue culture techniques; Varieties and cultivars of various horticultural crops; IPR issues; National, international and professional societies and sources of information on horticulture.<br>**Practicals**:<br>1. Vegetative Propagation: Leaf bud cutting, Grafting methods. | TENTATIVE DATES | August: 2 (2), 5, 7, 9(2), 12, 14, 16(2), 19, 21(2), 23(2), 26, 28, 30(2)=19<br>September: 2, 9(2), 11, 13(2), 16, 18(2), 20(2), 23, 27(2), 30=15<br>October: 4(2), 7, 9, 11(2), 14, 16(2), 30=10<br>November: 1(2), 4, 6, 8(2), 11, 16(2), 18, 20, 22(2), 25, 29(2)=16 |
| | NUMBER OF CLASSES | 60 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the different aspects of Horticultural techniques, effect of plant growth regulators, manure and fertilizers on horticultural plants growth and developments. They will also know about the practical knowledge of weed control, irrigation methods and plant propagation methods. They will also gather knowledge on the different diseases of horticultural crops and their managements, IPM, different quarantine practices, conservation of germplasm and IPR issues.<br>2. Practically students will know the different plant progative methods (cutting, layering, grafting, budding and plant tissue culture methods) of horticultural crops. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 3. ICT, Black board/White board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 5th Semester (Regular)-CBCS** | |
| PAPER NAME: | **Economic Botany and Plant Biotechnology** | |
| PAPER CREDIT: | Theory Credit: 04<br>Practical Credit: 02 | |
| PAPER CODE: | BOT-RE-5026 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 60<br>Practical: 20<br>Internal Assessment: 20 |

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| Unit 2: Cereals (4 Lectures) Wheat - Origin, morphology, uses.<br>Unit 8: Introduction to biotechnology.<br>Unit 9: Plant tissue culture: Micro propagation; haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications. | TENTATIVE DATES | August: 7, 14, 21, 28(2)=05<br>September: 11(2), 18=03<br>October: 9, 16, 30=03<br>November: 6, 20(2)=03 |
| | NUMBER OF CLASSES | 14 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the origin, morphological characters and how to process wheat and it's various aspects of importance to man.<br>2. Students will know the cultivation process of of wheat. Practically students will also know the different methods of raising of plants through Micropropagation methods (plant tissue culture methods) of economically important plants, medicinal and endangered plant species. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 4. ICT, Black board/White board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 1st Semester** | |
| PAPER NAME: | **Diversity I(Algae, Fungi, Bryophytes)**<br>1. Diversity I (Algae, Fungi, Bryophytes)<br>**2.** Practical Paper - Algae, Fungi, Bryophytes and Pteridophytes | |
| PAPER CREDIT: | 6+4=10 | |
| PAPER CODE: | 1. BOT-1016<br>2. BOT-1044 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
| **Unit-II**<br>Fungi: Characteristics of fungi and cell structure, recent trends in classification and phylogeny, major groups and their interrelationships. Different mode of reproduction, parasexuality and degeneration of sex in fungi.<br>**Unit-III** | TENTATIVE DATES | August: 12, 16, 17, 18, 19, 23, 24, 25, 26, 30, 31=11<br>September:1, 7, 8, 9, 13, 14, 15, 16, 20, 21, 22, 23, 27, 28, 29, 30=16<br>October: 4, 5, 6, 7, 11, 12, 13, 14, 19=09<br>November: 1, 2, 3, 4, 8, 9, 10, 11, 16, 17, 18, 22, 23, 24, 25, 29, 30=17 |
| | NUMBER OF CLASSES | 53 |

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| Fungi: Physiological and ecological specialization (coprophilous, cellulolytic, entomogenous and lignolytic); Mutualism: Mycorrhiza, Lichen; Parasites: common parasites of plants and humans, Saprophytes - decomposition of organic matter, Economic importance.<br>**Unit-IV**<br>Lichen: Classification and nomenclature, structure and reproduction, mechanism of phycobiont and mycobiont interaction, lichen as ecological indicator.<br>**Unit-V**<br>**Virus**: Types and nomenclature of viruses, replication of RNA and DNA viruses, virus-vector relationships, tumor virus, viroids, prions and interferons.<br>**Bacterial cell**: Ultra structure, cell wall, different groups of bacteria, recent developments in classification.<br>**PRACTICALS**:<br>1. Gram staining, flagella staining, capsule staining and acid fast staining of bacteria.<br>2. Collection and study of symptoms of virus infected plants.<br>3. Study of morphological, anatomical and reproductive features of some fungi growing in Assam<br>4. Study of morphological and anatomical features of some lichens growing in Assam. | LEARNING OUTCOMES | 1. Students will understand the diversity, life cycle pattern, phylogeny and economic values of Cryptogmic and Phanerogamic plants including Fungi, Bacteria, Virus, Lichen and Mycorrhiza.<br>2. Students will be skilled in the field of Microbiology and Plant Pathology. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 5. ICT, white board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
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| COURSE: | **M.Sc 3rd Semester** | |
| PAPER NAME: | **Research Methodology and Bio-instrumentation** | |
| PAPER CREDIT: | 6 | |
| PAPER CODE: | BOT-3036 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20 |
| **Unit- II:**<br>Sample and sampling, techniques for collection of field samples (plant, soil and water); Dos and don't s in fields; Lab safety measures, code of conduct in laboratory, handling of chemicals; | TENTATIVE DATES | August: 4, 11, 25=03<br>September: 1, 8, 15, 22, 29=05<br>October: 6, 13=02<br>November: 3, 10, 17, 24=04 |
| | NUMBER OF CLASSES | 14 |
| | LEARNING | 1. Students will understand the different |

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| First aid in field and lab, Experimental design. | OUTCOMES | techniques used for field samples collection for research purpose.<br>2. Students will also know different laboratory safety measures, rules and regulation and code of conduct of lab while working in laboratory. |
| | PLANNED ACTIVITIES | 1. Theory classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 6. ICT based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP-2nd Semester)** | |
| PAPER NAME: | **Cell Biology and Biomolecules** | |
| PAPER CREDIT: | 03+01=04 (Theory=03, Practical=01) | |
| PAPER CODE: | 100-199 | |
| UNIT/ TOPIC: | MARKS ASSIGNED: | Theory: 60<br>Practical: 25<br>Internal Assessment: 15 |
| **Unit 3: Cell organelles:**<br>Nucleus: Structure-nuclear envelope, Organization of chromatin, Nucleolus, Ribosome, Chloroplast, Mitochondria, Peroxisomes, Endoplasmic Reticulum, Golgi Apparatus, and Lysosomes.<br><br>**PRACTICALS**:<br>1. Counting the cells per unit volume with the help of haemocytometer. (Yeast/ pollen grains). | TENTATIVE DATES | January: 24(1), 27(1)= 02<br>February:1, 3, 5, 7, 8, 10, 12,15, 17, 19, 21, 22, 26, 28, 29= 15<br>March: 2, 4, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 23, 27, 28, 30=16<br>April: 1, 3, 4, 6, 8, 10, 17, 18, 20, 22, 24, 25, 27, 29=15<br>May: 2, 4, 6, 8, 9, 11, 13, 15, 16, 18=10 |
| | NUMBER OF CLASSES | 58 |
| | LEARNING OUTCOMES | On successful completion of the course, students will be:-<br>1. Detailed knowledge of the structure, properties, and functions of a cell and its components.<br>2. Acquainted with practical knowledge of properties of cell. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test<br>4. Quiz<br>5. Group discussion |
| | RESOURCE/ MATERIALS | 1. Field study<br>2. ICT, Black board/White board based classes<br>3. Teaching through photographs, charts and models. |

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| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Field study<br>5. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 4th Semester (SEC)-CBCS** | |
| PAPER NAME: | Nursery and Gardening | |
| PAPER CREDIT: | 02+02=04 (Theory=02, Practical=02) | |
| PAPER CODE: | BOT-SE-4014 | |
| UNIT/ TOPIC: | MARKS ASSIGNED: | Theory: 50<br>Practical: 50 |
| **Unit 3:** Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants – green house-mist chamber, shed root, shade house and glass house.<br>**Practicals**:<br>1. Cutting, Layering and Grafting techniques<br>2. Field visit to different Nursery and Gardens. | TENTATIVE DATES | January: 25=01<br>February:7, 21, 28=03<br>March: 7, 14, 21, 28=04<br>April: 4, 18, 25=03<br>May: 2, 9, 16, 30=04 |
| | NUMBER OF CLASSES | 15 |
| | LEARNING OUTCOMES | 1. Students will develop entrepreneurship skill through establishing their own Nursery Units.<br>2. Acquire skills for production, maintenance and propagation techniques of different horticulturally important plants.<br>3. Acquire skills to establish and maintain different types of Gardens. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment |
| | RESOURCE/ MATERIALS | 1. Field study<br>2. ICT, Black board/White board based classes<br>3. Teaching through photographs, charts and models. |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Field study |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 6th Semester (Honours)-CBCS** | |
| PAPER NAME: | Industrial and Environmental Microbiology | |
| PAPER CREDIT: | Theory Credit: 04<br>Practical Credit: 02 | |
| PAPER CODE: | BOT-HE-6016 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 60<br>Practical: 20<br>Internal Assessment: 20 |
| **Unit 3: Microbial production of industrial products:-** | TENTATIVE DATES | January: 24(2), 31(2)=04<br>February:2, 5, 7(2), 9, 12, 16, 19, 21(2), 23, 26, |

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| Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation(qualitative and quantitative) of Enzyme: amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin)<br>**Unit 5: Microbes and quality of environment:-**<br>Distribution of microbes in air; Isolation of microorganisms from soil, air and water.<br>**Unit 6: Microbial flora of water:**<br>Water pollution, role of microbes in sewage and domestic waste water treatment systems.<br>Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples.<br>**Unit 7: Microbes in agriculture and remediation of contaminated soils:**<br>Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.<br>**Practicals**:<br>1. Principles and functioning of instruments in microbiology laboratory<br>2. Hands on sterilization techniques and preparation of culture media.<br>3. Pure culture techniques. | | 28(2)=14<br>March:1, 4, 6(2), 11, 13(2), 15, 18, 20(2), 22, 27(2)=14<br>April: 1, 3(2), 5, 8, 10(2), 19, 22, 24(2), 26, 29-17<br>May: 3, 6, 8(2), 10=06 |
| | NUMBER OF CLASSES | 55 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the different uses of microbes in production of industrial products by fermentation technology.<br>2. Students will know the role of microbes in maintaining the quality of environment specially air water and soil; role and uses of microbes in agriculture and role of microbes in remediation of contaminated soils.<br>2. Practically students will know the different principles and functions of instruments/apparatus uses in microbiology laboratory; methods of sterilization of culture media, glasswares etc.; preparation of culture media and pure culture techniques. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 7. ICT, Black board/White board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 6th Semester (Honours)-CBCS** | |
| PAPER NAME: | Project Work/Dissertation | |
| PAPER CREDIT: | Credits: 06 | |
| PAPER CODE: | BOT-HE-6036 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Total=100 |
| Any topic will be selected/offered to the students from Botany (science | TENTATIVE DATES | January: 24=01<br>February:7, 9, 14, 16, 21, 23, 28=07<br>March: 1, 6, 13, 15, 20, 22, 27=07 |

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| discipline). | | April: 3, 5, 10, 17, 19, 24, 26=07<br>May: 3, 8, 10, 15=04 |
| | NUMBER OF CLASSES | 26 |
| | LEARNING OUTCOMES | 1. Students will acquire vast knowledge on the topics offered to them regarding the methology, research design, writing project/dissertation by acquiring scientific knowledge.<br>2. Practically students will know the different principles and functions of instruments/apparatus uses in laboratory, different lab safety rules and regulations. |
| | PLANNED ACTIVITIES | 1. Lab based activities. |
| | RESOURCE/ MATERIALS | 8. ICT, Black board/White board based research methodology classes.<br>2. Journals e-journals.<br>3. Internet |
| | ASSESMENT | 1. Class attendance.<br>2. Power point presentation. |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 6th Semester (Regular)-CBCS** | |
| PAPER NAME: | Mushroom Culture Technology | |
| PAPER CREDIT: | Theory Credit: 02<br>Practical Credit: 02 | |
| PAPER CODE: | BOT-SE-6024 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 50<br>Practical: 50 |
| **Unit 1:** Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus.*<br>**Unit 2:** Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the | TENTATIVE DATES | January: 24=01<br>February:7, 21, 28=03<br>March: 6, 13, 20, 27=04<br>April: 3, 10, 24=03<br>May: 8, 15=02 |
| | NUMBER OF CLASSES | 13 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the history and recent development of mushrooms and its cultivation, different mushroom species, nutritive values, importance to human life.<br>2. Practically students will know the different principles and methods of instruments/apparatus uses in mushroom cultvation; construction of mushroom house, methods of sterilization of substrates, different techniques uses for the cultivation of mushrooms. |
| | PLANNED | 1. Theory and practical classes<br>2. Home assignment |

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| mushroom bed preparation<br>- Low cost technology, Composting technology in mushroom production.<br><br>**Practicals**:<br>1. Design of mushroom culture house and its maintenance.<br>2. Methods of spawn production; preparation of substrates for Paddy straw mushroom and Button mushroom. | ACTIVITIES | 3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 9. ICT, Black board/White board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **B.Sc 6th Semester (Regular)-CBCS** | |
| PAPER NAME: | Project Work/Dissertation | |
| PAPER CREDIT: | Credits: 06 | |
| PAPER CODE: | BOT-RE-6026 | |
| UNIT/ TOPIC | MARKS ASSIGNED: | Total=100 |
| Any topic will be selected/offered to the students from Botany (science discipline). | TENTATIVE DATES | January: 24=01<br>February:7, 21, 28=03<br>March: 6, 13, 20, 27=04<br>April: 3, 10, 24=03<br>May: 8, 15=02 |
| | NUMBER OF CLASSES | 13 |
| | LEARNING OUTCOMES | 1. Students will acquire vast knowledge on the topics offered to them regarding the methology, research design, writing project/dissertation by acquiring scientific knowledge.<br>2. Practically students will know the different principles and functions of instruments/apparatus uses in laboratory, different lab safety rules and regulations. |
| | PLANNED ACTIVITIES | 1. Lab based activities. |
| | RESOURCE/ MATERIALS | 10. ICT, Black board/White board based research methodology classes.<br>4. Journals e-journals.<br>5. Internet |
| | ASSESMENT | 3. Class attendance.<br>4. Power point presentation. |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 2nd Semester** | |
| PAPER NAME: | 1. Microbiology and Plant Pathology<br>**2.** Practical Paper: Microbiology, Plant Pathology and Cytogenetics | |
| PAPER CREDIT: | 6+4=10 | |

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| PAPER CODE: | 1. BOT-2026<br>2. BOT-2044 | |
| UNIT/ TOPIC<br>**Unit-I**<br>Microbial diversity: 'Species' and 'Strain' concept in microbiology, ICN for virus, bacteria and other microbes, microbiome concept, ecological significance of microbes, microbiology of soil, air, water and milk.<br>**Unit-V**<br>Immunology: Innate and acquired immunity, antibodies, cells and tissues of the immune system, immune diseases, serological reactions and serodiagnostics, cancer biology.<br>**Unit-VI**<br>Applied microbiology: Application of microbes in the field of agriculture, fermented foods and dairy products, industry and bio-waste management. | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
| **PRACTICALS**:<br>1. Isolation and pure culture of microbes from soil, air and water.<br>2. Estimation of water quality.<br>3. Identification and characterization of milk bacteria and nodule bacteria.<br>4. Methylene blue reductase test for bacterial contamination of milk.<br>5. Study of plant pathogenic fungi from diseased specimens (symptoms, causal organism and their morphological & reproductive characters)<br>6. Spore measurement and camera lucida diagram | TENTATIVE DATES | February: 2, 6(2), 9, 13(2), 16, 20(2), 23, 27(2)=16<br>March: 1, 5(2), 12(2), 15, 19(2), 22, 26(2)=15<br>April: 2(2), 5, 9(2), 19, 23(2), 26, 30(2)=15<br>May: 3, 7(2), 10, 14(2), 17, 21(2), 24, 28(2), 31=17 |
| | NUMBER OF CLASSES | 63 |
| | LEARNING OUTCOMES | 1. Knowledge on microbial diversity, techniques, microbial genetics and physiology<br>2. Knowledge on principles plant pathology and mechanism of pathogenesis, immunology and applied microbiology. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 11. ICT, white board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 4th Semester Microbiology (Special Paper)** | |
| PAPER NAME: | Microbiology (Paper I)<br>Practical Paper: | |

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| PAPER CREDIT: | 5 | |
| PAPER CODE: | 1. BOT 4165 (Theory) | |
| **UNIT/ TOPIC (BOT 4165)**<br>**Unit-II**<br>Soil microbiology: Soil environment, microbial diversity in soil, soil microbial communities and decomposition of organic matter, methods to detect and quantify soil microbes, soil metagenomics, biosensors to monitor soil health and toxicity.<br>**Unit-III**<br>Agricultural microbiology: Agriculturally important microbes, biological N2-fixation, phosphate solubilization, PGPRs, rhizosphere, phyllosphere, Mycorrhiza,Biofertilizers, Crop diseases caused by different pathogens, Bio-control of plant diseases.<br>**Unit-V**<br>Food microbiology: Fermented foods (milk, meat, vegetables, beer, wine and vinegar, SCP), food spoilage, food sterilization and preservation, food borne diseases. | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
| | TENTATIVE DATES | January: 24(1), 27, 29(1), 30(1), 31=08<br>February:2(1), 3, 5(1), 6(1), 7, 9(1), 10, 12(1), 13(1), 16(1), 17, 19(1), 20(1), 21, 23(1), 26(1), 27(1), 28=30<br>March: 1(1), 2, 4(1), 5(1), 6, 8(1), 9, 11(1), 12(1), 13, 15(1), 16, 18(1), 19(1), 20, 22(1), 23, 26(1), 27, 30=39<br>April: 1(1), 2(1), 3, 5(1), 6, 8(1), 9(1), 10, 19(1), 20, 22(1), 23(1), 24, 26(2), 27, 29(1), 30(1)=28<br>May: 3(1), 4, 6(1), 7(1), 8, 10(1), 11, 13(1), 14(1), 15, 17(1), 18, 20(1), 21(1), 22, 24(1), 25, 27(1), 28(1), 29, 31(1)=34 |
| | NUMBER OF CLASSES | 139 |
| | LEARNING OUTCOMES | 1. Knowledge on Microbial interactions, bioremediation, microorganisms in mining and energy production.<br>2. Knowledge on soil microbes, soil metagenomics.<br>3. Knowledge of Biofertilizers and biocontrol of plant diseases |

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| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 12. ICT, white board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 4th Semester Microbiology (Special Paper)** | |
| PAPER NAME: | Microbiology (Paper II) | |
| PAPER CREDIT: | 5 | |
| PAPER CODE: | BOT 4175(Theory) | |
| **UNIT/ TOPIC (BOT 4175):**<br>**Unit- V**<br>Genetic engineering – tools and techniques, manipulation of natural genetical processes in biotechnology, restriction enzymes and ligases, cloning and expression vectors (plasmid, Ti plasmid, cosmid, fosmid, BAC, YAC and PAC). | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
| | TENTATIVE DATES | |
| | NUMBER OF CLASSES | |
| | LEARNING OUTCOMES | 1. Microbial genetics, tools and techniques of genetic engineering CO2.Knowledge conjugation, transduction and transformation in Bacteria CO3.<br>2. Knowledge on microbial biotechnology for human welfare. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 13. ICT, white board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 4th Semester Microbiology (Special Paper)** | |

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| PAPER NAME: | Microbiology (Paper III) | |
| PAPER CREDIT: | 5 | |
| PAPER CODE: | BOT 4185(Theory) | |
| **UNIT/ TOPIC (BOT 4185):**<br>**Unit- I**<br>Laboratory diagnoses and control of human diseases caused by virus (AIDS, hepatitis, H1N1), bacteria (*Streptococcus pyogenes, Mycobacterium tuberculosis*), fungi (Aspergillosis, Candidiasis) and protozoa (malaria).<br>**Unit- II**<br>Control of Microorganisms: Physical, chemical and biological; Antibiotics, mode of action of antibiotics, multidrug resistance in bacteria, principles of microbial assay. | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
| | TENTATIVE DATES | |
| | NUMBER OF CLASSES | |
| | LEARNING OUTCOMES | 1. Knowledge of laboratory diagnosis and control of AIDS, hepatitis, swine flue CO2. Knowledge on immunology including immunity, antigen – antibodies CO3.Basic knowledge of mutagens and carcinogens in cancer biology. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 14. ICT, white board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 4th Semester Microbiology (Special Paper)** | |
| PAPER NAME: | **Practical:** | |
| PAPER CREDIT: | 4 | |
| PAPER CODE: | BOT 4204 (Practical) | |
| UNIT/ TOPIC<br>**PRACTICALS:**<br>1. Isolation of specific microorganisms using specific media | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:** |

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| 2. Staining of bacterial spore, capsule and flagella<br>3. Bacteriological water analysis.<br>4. Methylene blue reductase/ Phosphatase test for milk<br>5. Biochemical tests (phosphatase, urease, nitrate reductase, cellulase) for the activity of microbes.<br>6. Study of microflora from the rhizosphere of agriculturally important crops. | | Practical: 80<br>Internal Assessment: 20 |
| | TENTATIVE DATES | January: 29(1), 30, 31(1)=05<br>February:2(1), 5(1), 7(1), 9(1), 12(1), 16(1), 19(1), 21(1), 23(1), 26(1), 28(1)=22<br>March: 1(1), 4(1), 6(1), 11(1), 13(1), 15(1),18(1), 20(1), 22(1), 27(1)=20<br>April: 1(1), 3(1), 5(1), 8(1), 10(1), 19(1), 22(1), 24(1), 26(1), 29(1)=20<br>May: 3(1), 6(1), 8(1), 10(1), 13(1), 15(1), 17(1), 20(1), 22(1), 24(1), 27(1), 29(1), 31(1)=26 |
| | NUMBER OF CLASSES | 93 |
| | LEARNING OUTCOMES | 1. Practices on isolation of microbes from different habitats.<br>2. Practices on biochemical test for activity of microbes.<br>3. Practices on biochemical test for identification of bacteria. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test/ Unit Test |
| | RESOURCE/ MATERIALS | 15. ICT, white board based classes<br>2. Teaching through photographs. charts and models. |
| | ASSESMENT | 1. Class test/Unit test<br>2. Class attendance<br>3. Home assignment<br>4. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |
| COURSE: | **M.Sc 4th Semester Microbiology (Special Paper)** | |
| PAPER NAME: | Dissertation | |
| PAPER CREDIT: | Credits: 5 | |
| PAPER CODE: | BOT 4195 | |
| UNIT/ TOPIC:-<br>Any topic will be selected/offered to the students from Environmental Microbiology and Plant Pathology. | MARKS ASSIGNED: | Dissertation = 50<br>Viva-Voce = 30<br>Internal Assessment = 20<br>**Total = 100** |
| | TENTATIVE | January: 29, 30=02 |

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| | DATES | February:1, 5, 6, 8, 12, 13, 15, 19, 20, 22, 26, 27, 29=13<br>March: 4, 5, 7, 11, 12, 14, 18, 19, 21, 26, 28=11<br>April: 1, 2, 4, 8, 9, 16, 18, 22, 23, 25, 29, 30=12<br>May: 2, 6, 7, 9, 13, 14, 16, 20, 21, 27, 28, 30=12 |
| | NUMBER OF CLASSES | 50 |
| | LEARNING OUTCOMES | 1. Students will acquire vast knowledge on the topics offered to them regarding the methology, research design, writing project/dissertation by acquiring scientific knowledge.<br>2. Practically students will know the different principles and functions of instruments/apparatus uses in laboratory, different lab safety rules and regulations.<br>3. Knowledge on solving the problems of degraded systems by employing candidate Microbes. |
| | PLANNED ACTIVITIES | 1. Lab based activities. |
| | RESOURCE/ MATERIALS | 1. ICT, Black board/White board based research methodology classes.<br>2. Journals e-journals.<br>3. Internet |
| | ASSESMENT | 1. Class attendance.<br>2. Power point presentation. |
| | REFLECTION | |
| | ACTION TAKEN | |

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| COURSE: | **FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP-2nd Semester)** | |
| PAPER NAME: | **Botany-SEC (Biofertilizers)** | |
| PAPER CREDIT: | 02+01=03 (Theory=02, Practical=01) | |
| PAPER CODE: | SEC0201303 | |
| UNIT/ TOPIC:<br>**Unit 1 :** General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, Biological nitrogen fixation, Actinorrhizal symbiosis.<br>**Unit 2 :** *Azospirillum:* isolation and mass multiplication – carrier based inoculant, *Azotobacter*: classification, characteristics – crop response to *Azotobacter* inoculum, maintenance and mass multiplication. | MARKS ASSIGNED: | Theory: 30<br>Practical: 25<br>Internal Assessment: 20 |
| | TENTATIVE DATES | February:1, 8, 15, 22, 29=05<br>March: 7, 14, 21, 28=04<br>April: 4, 18, 25=03<br>May: 2, 9, 16, 30=04 |
| | NUMBER OF CLASSES | 16 |
| | LEARNING OUTCOMES | 1. Students will acquire knowledge on the different microbes use as bio-fertilizers, substitutes as chemical fertilizers and environmental pollution. They will also know about the morphological and associative characters of the different microbes with other plants and aware the uses of bio-fertilizers in the production of different crops plants.<br>2. Practically students will know the mass cultivation of *Rhizobium, Azospirillum* and *Azotobacter* bacteria in artificial laboratory conditions. |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test<br>4. Quiz |
| | RESOURCE/ MATERIALS | 1. Field study<br>2. ICT, Black board/White board based classes<br>3. Teaching through photographs, charts and models. |
| | ASSESMENT | 1. Class test<br>2. Class attendance<br>3. Home assignment<br>4. Field study<br>5. Sessional examination |
| | REFLECTION | |
| | ACTION TAKEN | |

(*Dr. Eushah Ali*)
Assistant Professor,
P.G. Dept. of Botany,
Madhab Choudhury College,
Barpeta, Assam

(*Dr. Dip Kr. Bhattacharjya*)
Head, P. G. Dept. of Botany,
Madhab Choudhury College,
Barpeta, Assam

Head
Department of Botany
Madhab Choudhury College
Barpeta.

03.06.24

Principal
Madhab Choudhury College
Barpeta

# TEACHING PLAN
# (2023-24)

Submitted by –

Dr. Arjun Adhikari
Assistant Professor
Department of Botany
Madhab Choudhury College, Barpeta.

# MADHAB CHOUDHURY COLLEGE, BARPETA

TEACHING/ LESSION PLANSESSION:

2023-24

(ODD and EVEN SEMESTER)

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| NAME OF THE TEACHER: | **Dr. ARJUN ADHIKARI** |
| DEPARTMENT | **BOTANY** |
| DESIGNATION: | ASSISTANT PROFESSOR |
| COURSE : | HIGHER SECONDARY 1st YEAR |
| PAPER NAME: | BIOLOGY (BOTANY) |
| PAPER CREDIT: | 70 (35) |
| PAPER CODE: | |

| UNIT/ TOPIC | MARKS ASSIGNED: | 35 |
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| **Unit-IV: PANT PHYSIOLOGY**<br>**Chapter -11: Photosynthesisin Higher Plants**<br>Early experiments relating to photosynthesis. Photosynthesis as a means of autotrophic nutrition: Site of photosynthesis, Pigments involved in photosynthesis (elementary idea), Photochemical and Biosynthetic phases of photosynthesis, cyclic and non- cyclic photophosphorylation, chemiosmotic hypothesis; photorespiration; C3 and C4 pathways, factors affecting photosynthesis.<br>**Chapter -12 Respiration inPlants**<br>Exchange of gases ; Cellular respiration: Glycolysis, Fermentation ,(anaerobic),TCA Cycle and Electron transport system (aerobic), Energy relations –Number of ATP molecules generated, anphibolic pathway ,respiratory quotient.<br>**Chapter -13 Plant Growth and Development**<br>Phases of Plant Growth and Plant Growth rate, conditions required for growth, differentiation, Dedifferentiation and redifferentiation. Sequence of developmental process in a plants cell Plant, Growth regulators-Auxin, Gibberelins, Cytokinins. Eltylene, ABA. | TENTATIVE DATES | Year 2023<br>August: 7, 14, 21, 28<br>September: 11, 18,<br>October: 9, 16, 30<br>November: 6, 20<br>December: 4, 11, 18<br><br>Year 2024<br>January: 8, 22<br>February: 5, 12, 19, 26<br>March: 4, 11 |
| | NUMBER OF CLASSES | 22 |
| | LEARNING OUTCOMES | On successful completion of thecourse, students will have:<br>1. Basic understanding of the mineral requirements of plants and their transport mechanisms.<br>2. Knowledge of phloem transport and translocation of food materials within the plants.<br>3. Understanding of the process of Photosynthesis and its variation in different group of plants<br>4. Insights on the growth and development process of plants and the role of PGRs |
| | PLANNED ACTIVITIES | Lectures, Powerpoint Presentation, Practicals |
| | RESOURCE/ MATERIALS | Books: Biology Class XI: NCERT<br>Modern's abc: Arora & Sabrawal<br>e-Resource: Slideshare, Youtube |
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| ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| REFLECTION | |
| ACTION TAKEN | |

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|---|---|
| COURSE : | FYUGP 1st SEMESTER |
| PAPER NAME: | PLANT AND MICROBIAL DIVERSITY |
| PAPER CREDIT: | 3 + 1 = 4 |
| PAPER CODE: | 100-199 |

| UNIT/ TOPIC | MARKS ASSIGNED: | 60 |
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| THEORY:<br>Algae: General features, cell structure, range of thallus structure, reproduction, and classification; a brief account on *Nostoc*, *Oedogonium*, and *Chara*<br><br>PRACTICAL:<br>Study of morphology of *Nostoc*, *Oedogonium*, *Chara* (Temporary preparation of slides). | TENTATIVE DATES | Aug- 5, 7, 10, 12, , 17, 19, 22, 24, 26, 29, 31,<br>Sept- 2, 7, 9, 12, 14, 16, 19, 21, 23, 26, 28, 30<br>Oct- 3, 5, 7, 10 |
| | NUMBER OF CLASSES | 27 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br><br>2. Basic understanding of the characteristics, distribution, classification, reproduction, and current status of Algal members.<br>3. Knowledge to identify various groups of Algae in the laboratory through morphological analysis. |
| | PLANNED ACTIVITIES | Lectures, Powerpoint Presentation |
| | RESOURCE/ MATERIALS | Books: Algae-Vasistha, Sinha, Singh<br>Algae- Sharma<br>e-Resource: Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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|---|---|
| COURSE : | FYUGP 1st SEMESTER (SEC) |
| PAPER NAME: | NURSERY AND GARDENING |
| PAPER CREDIT: | 2 + 1 = 3 |
| PAPER CODE: | SEC0106803 |

| UNIT/ TOPIC | MARKS ASSIGNED: | 50 |
|---|---|---|
| Unit 4:<br>Topic: Gardening:<br><br>Definition, Objectives and scopes, different types of gardening | TENTATIVE DATES | September: 01, 08, 15, 22, 29<br>October: 06, 13<br>November: 03, 10, 17 |
| | NUMBER OF CLASSES | 10 |
| | LEARNING OUTCOMES | After the successful completion of classes students will be able to:<br>i. Recall the different aspects of gardening operations like soil quality, manure, etc required for gardening.<br>ii. Recall the different ways and types of watering techniques that can be applied in the garden and fields.<br>iii. Recall different types of garden.<br>iv. Familiarized with different tools used in nursery and gardening.<br>v. Recall how to plant and grow, understand and identify different stages of plant growth and identify plant's needs and to provide basic maintenance and care. |
| | PLANNED ACTIVITIES | Lectures, Powerpoint Presentation |
| | RESOURCE/ MATERIALS | Books: Text Book of Nursery & Gardening (Akhil Baruah)<br>e-Resource: Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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|---|---|
| COURSE : | FYUGP 2nd SEMESTER (SEC) |
| PAPER NAME: | BIOFERTILIZERS |
| PAPER CREDIT: | 2 + 1 = 3 |
| PAPER CODE: | SEC0201303 |

| UNIT/ TOPIC | MARKS ASSIGNED: | 50 |
|---|---|---|
| THEORY:<br>Unit 3: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation. | TENTATIVE DATES | February- 23,<br>March- 1, 15, 22<br>April- 5 |
| | NUMBER OF CLASSES | 5 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Basic understanding of role of Cyanobacteria as Biofertilizers<br>2. Knowledge of Anabaena-Azolla association and their nitrogen fixing capacity |
| | PLANNED ACTIVITIES | Lectures, PowerPoint Presentations |
| | RESOURCE/ MATERIALS | Books:<br>Algae-Vasistha, Sinha, Singh<br><br>e-Resource: Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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|---|---|
| COURSE : | B.Sc. 3rd SEMESTER (GE + R) |
| PAPER NAME: | PLANT PHYSIOLOGY AND METABOLISM |
| PAPER CREDIT: | 4 + 2 = 6 |
| PAPER CODE: | BOT-RC-3016 |

| UNIT/ TOPIC | MARKS ASSIGNED: | 60 + 20 |
|---|---|---|
| THEORY:<br>**UNIT-2: Mineral Nutrition**<br>Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps.<br>**UNIT-3: TRANSLOCATION IN PHLOEM**<br>Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.<br>**UNIT 4 : PHOTOSYNTHESIS**<br>Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration.<br>**UNIT-8 PLANT GROWTH REGULATORS**<br>Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene. | TENTATIVE DATES | Aug- 8, 10, 17, 19, 22, 24, 29, 31<br>Sept- 5, 7, 12, 14, 19, 21, 26, 28<br>Oct- 3, 5, 10, 12, 31 |
| | NUMBER OF CLASSES | 21 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>4. Basic understanding of the mineral requirements of plants and their transport mechanisms.<br>5. Knowledge of phloem transport and translocation of food materials within the plants.<br>6. Understanding of the process of Photosynthesis and its variation in different group of plants<br>7. Insights on the growth and development process of plants and the role of PGRs |
| | PLANNED ACTIVITIES | Lectures, PowerPoint Presentations |
| | RESOURCE/ MATERIALS | Books:<br>Principles of Plant Physiology- A. C. Sahu<br>Fundamentals of Plant Physiology- V.K. Jain<br>e-Resource: Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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|---|---|
| COURSE : | B.Sc. 3rd SEMESTER (SEC) |
| PAPER NAME: | BIOFERTILIZERS |
| PAPER CREDIT: | 4 |
| PAPER CODE: | BOT-SE-3014 |

| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 50<br>Practical: 50 |
|---|---|---|
| THEORY:<br>Unit 3: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation. | TENTATIVE DATES | Aug- 9, 16, 23, 30<br>Sept- 6, 13, 20, 27<br>Oct- 4 |
| | NUMBER OF CLASSES | 9 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Basic understanding of role of Cyanobacteria as Biofertilizers<br>2. Knowledge of Anabaena-Azolla association and their nitrogen fixing capacity |
| | PLANNED ACTIVITIES | Lectures, PowerPoint Presentations |
| | RESOURCE/ MATERIALS | Books:<br>Algae-Vasistha, Sinha, Singh<br><br>e-Resource: Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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| COURSE : | BSc Botany 4th Semester (H) |
| PAPER NAME: | PLANT ECOLOGY AND PHYTOGEOGRAPHY |
| PAPER CREDIT: | 4 + 2 = 6 |
| PAPER CODE: | BOT-HC-4026 |

| UNIT/ TOPIC | MARKS ASSIGNED: | 60 + 20 |
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| THEORY:<br>**Unit 1 : INTRODUCTION**<br>Basic concepts; Levels of organization. Inter-relationships between the living world and the environment, the components and dynamism, homeostasis.<br>**Unit 4 : ADAPTATION OF PLANTS TO VARIOUS ENVIRONMENTAL FACTORS**<br>Light, temperature, wind and fire<br>**Unit 7 : PLANT COMMUNITIES**<br>Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession –processes, types; climax concepts.<br>**Unit 8: ECOSYSTEMS** Structure; Processes; Trophic organisation; Food chains and Food webs; Ecological pyramids.<br>**Unit 10 : PHYTOGEOGRAPHY**<br>Principles; Continental drift; Theory of tolerance; Endemism; Brief description of major terrestrial biomes (one each from tropical, temperate & tundra); Phytogeographical division of India; Vegetation types of NE India with special reference to Assam.<br><br>**PRACTICALS:**<br>1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.<br><br>2. Determination of pH of various soil and water samples using pH meter. | TENTATIVE DATES | January- 24, 29<br>February-5,7,12,19,26,28<br>March- 4, 6,11,13,18,20,27<br>April-1,3,8,10,17,22,24 |
| | NUMBER OF CLASSES | 22 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Basic understanding of the environment and ecological organizations.<br>2. Knowledge of plant adaptations to various environmental factors.<br>3. Understanding of the concept of plant communities and their characters.<br>4. Insights on the different aspects of ecosystem and their functions.<br>5. Knowledge of the principles and theories of phytogeography as well as endemism. |
| | PLANNED ACTIVITIES | Lectures, PowerPoint Presentations, Group discussions |
| | RESOURCE/ MATERIALS | Books:<br>1. Ecology and Environment-P D Sharma<br>2. A text book of Plant Ecology-Ambasht and Ambasht |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |

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| 6. (a). Study of morphological adaptations of hydrophytes and xerophytes (four each).<br>(b). Study of biotic interactions of the following: Stem parasite (Cuscuta), Root parasite (Orobanche) Epiphytes, Predation (Insectivorous plants). | ACTION TAKEN | |

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| COURSE : | B.Sc. 5th SEMESTER (H) |
| PAPER NAME: | PLANT PHYSIOLOGY |
| PAPER CREDIT: | 4 + 2 = 6 |
| PAPER CODE: | BOT-HC-5026 |

| UNIT/ TOPIC | MARKS ASSIGNED: | Theory: 60<br>Practical: 20<br>Internal Assessment: 20 |
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| THEORY:<br>**Unit 2 : Mineral nutrition** Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents, Ion antagonism and toxicity.<br>**Unit 3 : Nutrient Uptake** Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump<br>and ion flux, uniport, co-transport, symport, antiport.<br>**Unit 4 : Translocation in the phloem**<br>Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.<br>**Unit 5 : Plant growth regulators** Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid. | TENTATIVE DATES | Aug- 8, 9, 10, 16, 17, 22, 23, 24, 29, 30, 31<br>Sept- 5, 6, 7, 12, 13, 14, 19, 20, 21, 26, 27, 28<br>Oct- 3, 5, 10, 11, 12, 31<br>Nov- 1, 2, 7, 8, 9 |
| | NUMBER OF CLASSES | 34 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Basic understanding of the mineral requirements of plants and their transport mechanisms.<br>2. Knowledge of phloem transport and translocation of food materials within the plants.<br>3. Understanding the process of nutrient uptake in plants<br>4. Insights on the growth and development process of plants and the role of PGRs |
| | PLANNED ACTIVITIES | Lectures, PowerPoint Presentations |
| | RESOURCE/ MATERIALS | Books:<br>Principles of Plant Physiology- A. C. Sahu<br>Fundamentals of Plant Physiology- V.K. Jain<br>e-Resource: e-Pathshala, Youtube tutorials, Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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| COURSE : | B.Sc. Botany 6th Semester (H) |
| PAPER NAME: | Plant Metabolism |
| PAPER CREDIT: | 4 + 2 = 6 |
| PAPER CODE: | BOT-HC-6016 |

| UNIT/ TOPIC | MARKS ASSIGNED: | 60 + 20 |
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| THEORY:<br>**Unit 2 : Carbon assimilation**<br>Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO2 reduction, photorespiration, C4-pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction.<br>**Unit 3 : Carbohydrate metabolism**<br>Synthesis and catabolism of sucrose and starch.<br>**Unit 5 : ATP-Synthesis**<br>Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers.<br><br>**PRACTICALS:**<br>1. Chemical separation of photosynthetic pigments.<br>2. Estimation of sugar content by Somogyi method.<br>6. Separation of amino acids by paper chromatography.<br>7. Demonstration of Thin layer chromatography (TLC).<br>8. Quantitative analysis of absorption spectrum of photosynthetic pigments. | TENTATIVE DATES | January: 24, 27, 29.<br>February: 2, 3, 5, 7, 9, 12, 16, 19, 21<br>March: 4, 6, 9, 15, 16, 18, 23, 27<br>April-1,3,6,17, 20,25,27,29<br>May-4,11 |
| | NUMBER OF CLASSES | 30 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Understanding of the process of Photosynthesis and its variation in different group of plants<br>2. Knowledge of catabolism and metabolism of sugars.<br>3. Understanding of the concept of plant communities and their characters.<br>4. Insights on the different mechanisms of ATP synthesis and the theories associated with the process.<br>5. Methods of pigment separation and sugar estimation. |
| | PLANNED ACTIVITIES | Lectures, PowerPoint Presentations, Group discussions |
| | RESOURCE/ MATERIALS | Books:<br>1. Principles of Plant Physiology- A. C. Sahu<br>2. Fundamentals of Plant Physiology- V.K. Jain<br>3. e-Resource: Slideshare, Research Papers |
| | ASSESMENT | Class Test, Group Discussions, Assignments, Sessional Exam |
| | REFLECTION | |
| | ACTION TAKEN | |

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| COURSE : | M.Sc. 1st SEMESTER |
| PAPER NAME: | 1. Diversity I (Algae, Fungi, Bryophytes)<br>2. Ecology, Environment and Resource Management |
| PAPER CREDIT: | 6 + 6 + 4 + 4 = 20 |
| PAPER CODE: | 1. BOT-1016 |

| UNIT/ TOPIC | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20 **Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
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| **Theory paper:**<br>**BOT-1016**<br>**Unit-I Algae:**<br>Diversity and classification, recent trends in the classification, pigmentation, morphology and reproduction, phylogeny and interrelationships among different groups, patterns of life cycle and post fertilization stages in Chlorophyta, Xanthophyta, Phaeophyta and Rhodophyta, Ecological importance in different habitats, Algal indicators, Algal blooms, Eutrophication, Productivity in fresh water and marine environment, symbiotic association, Algal culture.<br><br>**BOT-1036**<br>**Unit -IV Environmental pollution-**<br>Sources, types of pollutants of various industrial effluents such as pulp and paper mills, oil exploration and refinery, petrochemicals, iron and steel industries, domestic wastes, organic debris, agricultural wastes, pesticides. Effects of pesticides on soil components, residual toxicity and pollution. Global climate change: greenhouse effects, ozone layer depletion, acid rain.<br>**Unit –VI: Phytogeography**<br>Dynamic phytogeography and its basic principles , theories and hypotheses, centre of origin of cultivated plants, plant migration, theory of tolerance, age and area hypothesis, concept of endemism, megacentres of endemism in India, endemic plants of India with special reference to N E India, phytogeographic regions of the world and India and their | TENTATIVE DATES | August: 17, 18, 19, 23, 25, 26, 30<br>September: 6, 8, 9, 13, 15, 20, 22, 23, 27, 30<br>October: 4, 6, 7, 11, 13, 14,<br>November: 1, 3, 4, 8, 10, 17, 22, 25, 29 |
| | NUMBER OF CLASSES | 32 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Clear understanding of the diversity, classification, life cycle pattern, culture techniques, phylogeny and economic values of Algae<br>2. Students will be skilled with the different pollution types and sources with special reference to NE India<br>3. Thorough learning of the different theories and principles associated with the phytogeography of the world. They will know about the endemic plants of the region and the metacenters of endemism in India |
| | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test<br>4. Seminar presentation |
| | RESOURCE/ MATERIALS | Books:<br>1. Ecology and Environment: P.D. Sharma<br>2. Fundamentals of Ecology: Eugene Odum<br><br>Self-prepared Complete Notes e-Resource: e-Pathshala, Youtube tutorials, Slideshare, Research Papers |
| | ASSESMENT | 1. Class test<br>2. Spot test |

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| haracteristic vegetations. Characteristic ora of N E India. | | 3. Class attendance<br>4. Home assignment<br>5. Field study and Academic excursion |
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| COURSE : | M.Sc. Botany 2nd Semester |
| PAPER NAME: | Plant Physiology and Biochemistry |
| PAPER CREDIT: | 6 + 4 = 10 |
| PAPER CODE: | BOT-2036<br>BOT-2054 |

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| UNIT/ TOPIC | MARKS ASSIGNED: | **Theory paper:**<br>Theory: 80<br>Internal Assessment: 20<br>**Practical paper:**<br>Practical: 80<br>Internal Assessment: 20 |
| THEORY:<br>**Unit-III PHOTOSYNTHESIS**:<br>Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO2 fixation-C3, C4 and CAM pathways.<br>**Unit-IV PLANT HORMONES:** Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.<br>**Unit-VI**<br>Solute transport and photo-assimilate translocation: uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; mechanisms of loading and unloading of photoassimilates.<br><br>**PRACTICALS:**<br>3. Extraction of carbohydrates from plant materials and estimation of reducing and non-reducing sugars.<br>6. Extraction of chloroplast pigments and | TENTATIVE DATES | January: 24, 27, 29.<br>February: 3, 5, 7, 9, 12, 17, 19, 21.<br>March: 4, 6, 9, 13, 16, 18, 20, 23, 27, 30<br>April-1,3,6,8,17, 20,24,27,29<br>May-4,11, 13,15 |
| | NUMBER OF CLASSES | 35 |
| | LEARNING OUTCOMES | On successful completion of the course, students will have:<br>1. Understanding of the process of Photosynthesis and its variation in different group of plants<br>2. Knowledge of catabolism and metabolism of sugars.<br>3. Understanding of the concept of plant communities and their characters.<br>4. Insights on the different mechanisms of ATP synthesis and the theories associated with the process.<br>5. Methods of pigment separation and sugar estimation. |

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| quantitative estimation; Determination of chlorophyll a/b ratio and total chlorophyll in C3, C4 and CAM plants.<br>7. Separation of amino acid mixture by thin layer / paper chromatography. | PLANNED ACTIVITIES | 1. Theory and practical classes<br>2. Home assignment<br>3. Class test<br>4. Seminar presentation |
| | RESOURCE/ MATERIALS | Books:<br>1. Principles of Plant Physiology- A. C. Sahu<br>2. Fundamentals of Plant Physiology- V.K. Jain<br>3. e-Resource: Slideshare, Research Papers |
| | ASSESMENT | 1. Class test<br>2. Spot test<br>3. Class attendance<br>4. Home assignment<br>5. Field study and Academic excursion |
| | REFLECTION | |
| | ACTION TAKEN | |

(*Dr. Dip Kr. Bhattacharjya*)
Head
P G Department of Botany
Madhab Choudhury College, Barpeta

Head
Department of Botany
Madhab Choudhury College
Barpeta.

(*Dr. Arjun Adhikari*)
Assistant Professor
P G Department of Botany
Madhab Choudhury College, Barpeta

Dr. Arjun Adhikari
Assistant Professor
P.G. Department of Botany
M.C. College, Barpeta

03.06.24

Principal,
Madhab Choudhury College
Barpeta