

**ONE-SEMESTER PRE- Ph.D. COURSE WORK SYLLABUS
DIBRUGARH UNIVERSITY**



2020

**DEPARTMENT OF LIFE SCIENCES
DIBRUGARH - 786004
ASSAM, INDIA**

Syllabus modified on 9th Feb 2016

Syllabus for one semester Pre Ph.D. Course Work

1. There shall be four Courses in One-Semester Course work for the Ph.D. programmes conducted in Dibrugarh University comprising with the following components:

Course I	: Research Methodology (Core)
Course II	: Optional (Intra/Inter-Departmental)
Course III	: Optional (to be offered by supervisor)
Course IV	: Assignment (under guidance of supervisor)

Courses	Internal Assessment	End Semester Exam	Total Weightage
Course I	40%	60%	100%
Course II	40%	60%	100%
Course III	40%	60%	100%
Course IV	80% (Assignment Writing)	20% (Viva on Assignment)	100%
Total Credit: 16			

Course I: L.Sc. Ph.D.C 10101: Research Methodology

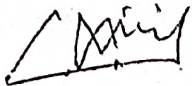
1st In-Sem =20 Marks
2nd In-Sem=20 Marks
End Sem=60 Marks
Total= 100 Marks

Unit -I: Fundamentals of Technical Aptitude: This unit will focus on the fundamental knowledge on technical terminologies for a research agenda in Life Sciences include definition of problem, reasoning, hypothesis, thesis, synopsis and research 25

Unit-II: Selection of research problem; writing synopsis, thesis, other technical communications, and presentation of technical communications 25

Unit -III: Computer Application in Biology, Biological Databases 25

Unit- IV: Project Writing, various funding agencies in the field of biology 25


Head
Department of Life Sciences
Dibrugarh University

**Course II: L.Sc. Ph.D.O1 10102: Optional
(Intra/Inter Departmental)**

The units I & II are compulsory and any two units from the rest

Unit -I: Biostatistics & Bioinformatics : Sampling theory, probability distribution, testing of hypothesis ,correlation and regression; experimental design and analysis of experimental results, CRD, RBD & LSD; experiments in farmer's field, biological assays, Use of software in biological analysis

25

Unit-II: Techniques in Biology: Biosafety in laboratory, Common instruments used in biological research, their operational principles and maintenance.

25

Unit-III: Method of collection and preservation of Plants

25

Unit-IV: Method of collection and preservation of animals

25

Unit-V: Phytochemistry of medicinal plants

25

Unit-VI: Maintenance of aquarium fish

25

Unit-VII: Biocontrol potential of microbes

25

Unit-VIII: Population interaction

25

Unit-IX: *In vitro* culture techniques

25

Unit-X: Molecular taxonomy

25

Unit-XI: r-DNA technology

25

**Course III: L.Sc. Ph.D.O2 10103: Optional
(Aquatic Biology & Fisheries)**

1st In-Sem =20 Marks

2nd In-Sem=20 Marks

End Sem=60 Marks

Total= 100 Marks

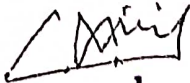
Unit –I: Overview of major groups of freshwater biota; identification of freshwater fishes- morphological and molecular markers technique used in fish identification; key to identification of major groups of freshwater fishes. 20

Unit –II: Ecology of freshwater systems in tropical and subtropical region – river, streams and wetlands and seasonal water bodies and their potentialities for aquaculture; River quantum concept, impact of flood pulse, natural factors and anthropogenic activities on riverine biota; riparian zone and flood plain lakes; restoration of wetland and river. 20

Unit –III: Methodologies applied in fish biology research- methods for assessing fish stock; fish diversity indices, index of biological integrity and its application in fisheries; estimation of fishing intensity ; feeding habit, growth, maturity and spawning. 20

Unit IV: Limnological methods: assessment of important physico-chemical parameter of water and soil, macrophytes, plankton and invertebrate fauna; application of remote sensing and GIS in water resource management. 20

Unit V: Home Assignment 20


Head
Department of Life Sciences
Dibrugarh University

**Course III: L.Sc. Ph.D.O2 10103: Optional
(Bioresource Management and Sustainable Development)**

1st In-Sem =20 Marks

2nd In-Sem=20 Marks

End Sem=60 Marks

Total= 100 Marks

Unit –I: Medicinal, aromatic and pesticidal plants of Upper Brahmaputra valley (UBV)

The unit will provide an overview on the plants having potential for medicinal, aromatic, and pesticidal properties. Emphasis will be given on those species which are used by various ethnic groups of UBV. The unit will focus on understanding present status, cultivation practices (if any), harvesting processing, economics and value addition and development of new package of practices for entrepreneurship development on these bioresources. 20

Unit –II: Nutritional status of non-conventional food plants and biodiversity conservation

The unit will provide an overview on the plant species having potential for nutritional value and used as additional foods by various ethnic groups of UBV. The unit will focus on understanding present status, cultivation/multiplication, harvesting, processing, nutritional status, economics and value addition and development of new package of practices for entrepreneurship development on these bioresources to obtain sustainability of the systems; population dynamics and carrying capacity in relation to biodiversity loss and stability of the forest, grassland and wetland ecosystems of UBV and to develop models of sustainability for these systems. 20

Unit- III: Biodynamic organic farming

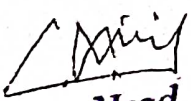
The unit will provide an overview on the traditional farming systems of various ethnic groups of UBV. The unit will focus on understanding the importance of biodynamic organic farming in maintenance of local as well as global environmental health. Emphasis will be given on integrated organic farming, comparative study between conventional versus organic farming, their assessment in terms of tangible and intangible (environmental issues) benefits, and development of new package of practice for entrepreneurship development on the organic products including organic manures and biopesticides and to obtain sustainability of the systems.

Unit-IV: Habitat degradation and ecorestoration in UBV

20

The unit will provide an overview of how various ecosystems of UBV have been degraded by anthropogenic activities. The unit will focus on understanding the causes of degradation of habitats by examining the past and present status of the habitats in connection with mining and agro industry activities, erection of hydroelectric power projects, erection of petroleum industries, urbanization practices, healthcare, and slaughter houses and to combat these problems on the habitats through restoration measures and to obtain sustainability of the habitats. 20

Syllabus modified on 9th Feb 2016


Head
Department of Life Sciences
Dibrugarh University

Unit V: Home assignment

20

**Course III: L.Sc. Ph.D.O2 10103: Optional
(Entomology)**

1st In-Sem =20 Marks

2nd In-Sem=20 Marks

End Sem=60 Marks

Total= 100 Marks

Unit-I: Modern approaches of Insect Taxonomy: Insect sampling technique, DNA extraction method, PCR technique. DNA sequencing. Molecular approach for insect identification Morphological tools for insect identification, Insect Orders with special reference to a particular order in question. 20

Unit-II: Insecticides: Classification chemical pesticides and mode of action, Third and fourth generation pesticides and their significances

Unit-III: Advances in insect pest management: Trends in development of integrated pest management in national and international context. Decision tools for pest management, Implementing IPM through new technology: Botanicals, Insect cell line, Recombinant DNA technology, trypsin inhibitor , lectin gene. 20

Unit IV Advances in insect plant interaction: Co-evolution between host plants and insects. Tritrophic interaction among plant-herbivores and their natural enemies, implementations of plant-herbivore interactions in pest management. Receptor system. Sensory perception in phytophagous insects. Role of enzymes in plant defence. Activation of plant defensive genes. 20

Unit V: Home assignment

20

**Course III: L.Sc. Ph.D.O2 10103: Optional
(Crop Improvement)**

1st In-Sem =20 Marks
2nd In-Sem=20 Marks
End Sem=60 Marks
Total= 100 Marks

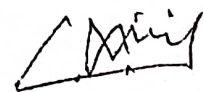
Unit I: Mutation: (a) at chromosomal level: euploidy and aneuploidy, deletion, duplication, translocation and cytogenetics and breeding behaviour of translocation heterozygote and deficiency, position effect, induction of polyploidy; (b) at molecular level: Frame shift and substitution mutation, DNA damage and repair, Spontaneous and induced mutation; mutagens and their mode of action and (c) at biochemical level: One gene - one enzyme hypothesis, biochemical degradation of phenylalanine in man, biochemical mutation in Neurospora. **20**

Unit II: Breeding procedure: for self pollinated, cross pollinated and vegetatively propagated plants, mutation and ploidy breeding including haploidy in crop improvement; genetic basis of heterosis, dominance and over dominance hypothesis, inbreeding depression, estimation of heterosis, types of hybrids and development of hybrid seeds, concept of distant hybridisation. **20**

Unit III: Resistance Breeding: Types of genetic resistance, vertical and horizontal resistance, mechanism of disease and insect resistances, factors or genes of resistance, source of resistance, breeding methods, advantage and limitations of resistance breeding. **20**

Unit IV: *In vitro* technique in plant breeding: cell and tissue culture, primary culture, cell line, cell clones, callus culture, somaclonal variation, micropropagation, somatic embryogenesis, haploidy, protoplast fusion and somatic hybridisation, transgenesis, artificial seeds, application and achievements of *in vitro* techniques in plant breeding. **20**

Unit V: Home assignment **20**



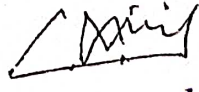
Head
Department of Life Sciences
Dibrugarh University

**Course III: L.Sc. Ph.D.O2 10103: Optional
(TAXONOMY AND COMPUTATIONAL BIOLOGY)**

1st In-Sem =20 Marks
2nd In-Sem=20 Marks
End Sem=60 Marks
Total= 100 Marks

Unit I	20
Basics of Taxonomy: Concept, Aims and Principles. Classificatory Systems: Pre- and Post Darwinian Classifications: Artificial, Natural, Phenetic, Phylogenetic. Alpha and Omega taxonomy, Numerical Taxonomy, Chemotaxonomy, Cytotaxonomy, Molecular Taxonomy.	
Unit II	20
Rules, Principles and History of Biological Nomenclature, Taxonomic hierarchy, Typification, Effective and Valid Publication, Authors' citation, Principles of Priority and Limitations, Draft Biocode and Phylocode. Taxonomic databases on the web.	
Unit III	20
Major Biological databases on the web, Primary and secondary databases: Nucleic acid sequence databases, Protein sequence databases, structural databases; Biodiversity related databases.	
Unit IV	20
Sequence alignment algorithms, BLAST and FASTA, Molecular Phylogenetic analysis, Basics of Computer Aided Drug Designing	
Unit V	20
Home assignment	

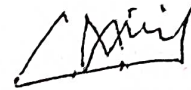
Syllabus modified on 9th Feb 2016


Head
Department of Life Sciences
Dibrugarh University

**Course IV: L.Sc. Ph.D. 10104:
Assignment**

In-Sem(assignment writing) =80 Marks
Viva (on assignment) =20 Marks
Total= 100Marks

Project work/ Home assignment/ Lab work to be conducted under the concerned supervisor.



**Head
Department of Life Sciences
Dibrugarh University**

**Course III: L.Sc. Ph.D. 02 10103: Optional
(Biochemistry)**

1st In-Sem =20 Marks
2nd In-Sem =20 Marks
End Sem =60 Marks

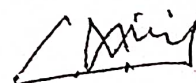
Total = 100 Marks

Unit I: Historical perspectives of Biochemistry and its development. Concept and design of metabolic pathways. Regulations of metabolic pathways. Types and functions of secondary metabolites: flavonoid, glycoprotein and glycolipids.

Unit II: Metabolism: Fermentation technology, amphibolic role of Kreb's cycle; lipid mobilization in the cell. Integration of carbohydrate, Protein and Lipid metabolism. Deficiency diseases and major inborn errors of metabolism. Concept of Phosphorylation: oxidative and non-oxidative energy; Electron transport system chemiosmosis theory of ATP synthesis, inhibitors of respiratory chain.

Unit III: Protein purification and sequencing, industrial proteins.

Unit IV: Enzymes: Definition and mode of action, factors affecting enzyme activity, Regulation of enzyme activity, enzyme kinetics; Enzyme inhibition; Cofactors and coenzymes; Biosensors.



Head
Department of Life Sciences
Dibrugarh University