

Plant Ecology:

1. Study of the common instruments (P^H meter, spectrophotometer, colorimeter, Muffle furnace, hot air oven, growth chamber, soil thermometer, maximum and minimum thermometer, hygrometer, psychrometer or dry and wet bulb thermometer, lux meter etc.) used in ecological investigation.
2. Study of floristic composition within the college campus / outside near to the college campus.
3. Determination of minimum sampling size (Species-area-curve) for vegetation study.
4. Determination of minimum number of samples to be taken for vegetation study (Species-area-curve).
5. Determination of abundance and density of herbaceous species in a study area.
6. Determination of percentage frequency of herbaceous species in a study area.
7. Determination of root – shoot ratio of herbaceous plants grown in different conditions.
8. Determination of Relative Growth Rate (RGR) of herbaceous species grown in different conditions.
9. Study of ecosystem structure by analyzing the producer, consumer, and decomposer (if possible) and preparation of food chain and food web of a particular locality to show the probable path (s) of energy transformation through the system.
10. Study of standing crop biomass and productivity of an ecosystem.

Phytogeography:

1. Preparation of chart on the major biomes of the world / landscape with distribution of plants with reference to particular ecological condition (s).

Evolution:

2. Study of permanent slides / fossil rocks having evolutionary significance.

SCHEME OF THE PRACTICAL EXAMINATION:

(End Semester)

Time: 4 hrs.

Marks: 32

1. Ecology	10
a) Major Expt.	7
b) Minor expt.	5
2. Phytogeography and evolution	5
3. Practical record book	5
4. Viva-Voce	5
Total	32

**Topic of the Project work may be given in the Semester-V and report should have scientific investigation and outcome with statistical analysis of data (where necessary). The same have to be presented in the headings: Title, Introduction, Objective, Materials & Methods, Results, Conclusion and References. The project will be evaluated in Semester-VI with the paper BOTMP-605. Separate project preferably be given to each student.*

**BOTANY MAJOR
BOTMT- 601**

Plant Physiology:

Objective of the course: The main objective of this course is to introduce the students with the basic knowledge on major physiological aspects of plants.

- Unit –1: Plant water relationships: Diffusion, imbibition and Osmosis; water potential and chemical potential; absorption of water; mechanism of active and passive absorption; water holding and wilting co-efficient; co-efficient; transpiration, its mechanism and significant factors.
- Unit –2: Ascent of sap: Definition; different theories related to ascent of sap; physiological effects of water deficit and stress physiology; Mineral nutrition in plants: Role of micro and macro elements; mineral deficiency symptoms in plant growth; Translocation of Organic Solutes: Transport of Photosynthates.
- Unit –3: Nitrogen Metabolism: Nitrogen Fixation (Symbiotic and Non-Symbiotic), nif-gene and nitrification.
- Unit –4: Photosynthesis: Historical background and significance; mechanism a) Light Reaction – Red Drop, Emerson Effect, Photosynthetic Pigments; two pigment systems; Cyclic and Non-cyclic Electron Transport; Photophosphorylation and production of Assimilatory Power, (b) Dark Reaction: Calvin Cycle (C3 pathway), Hatch-Slack Pathway (C4 pathway); differences between C3 and C4 cycle; Photorespiration, Crassulacian Acid Metabolism (CAM) and Chemosynthesis; factors affecting photosynthesis.
- Unit –5: Respiration: Glycolysis and TCA Cycle, Pentose Phosphate pathway; oxidative phosphorylation.
- Unit – 6: Growth and Development: Definitions; Phases of Growth; Kinetics of Growth; Physiology of Seed Dormancy and Germination; Photoperiodism and Vernalisation; Phytohormones; Plant Movements –tropic and nastic.

**BOTANY MAJOR
BOTMP- 602**

Marks: 40(32 End+8 IA)

Properties of colloids: imbibition and absorption of water and solutes – Osmosis in plant tissues; determination of osmotic pressure and suction pressure; root plant tissues; determination of inorganic constituents of tissues and the experiments on transpiration, respiration, photosynthesis, growth and movement, ash analysis on transpiration, respiration, photosynthesis, growth and movement, ash analysis.

**SCHEME OF THE PRACTICAL EXAMINATION:
(End Semester)**

Time: 4 hrs.

Marks: 32

1. Experiment		
a)Major		14
b)Minor		8
2. Practical record book		5
3. Viva voce		5
		Total
		32

BOTMT- 603

48 End+12 IA=60

Molecular Biology and Immunology:

Objective of the course: The main objective of this course is to introduce the students with the fundamentals of molecular biology and immunology.

Molecular Biology:

Marks: (32+8)=40

Unit –1: Nucleic Acids, DNA as genetic material, structure and functions of DNA & RNA, Watson & Crick Model of DNA, other forms of DNA (A & Z), Genome organization in prokaryotes and eukaryotes.

Unit–2: Replication of DNA- prokaryotes and eukaryotes, Transcriptions in prokaryotes and eukaryotes.

Unit–3: Features of genetic code wobble hypothesis, protein biosynthesis in prokaryotes and eukaryotes.

Unit–4: Recombination in Prokaryotes; Transformation, Conjunction and Transduction; , Concept of Transposons and Plasmids.

Unit –5: Regulation of Gene Expression in Prokaryotes- Operon concept (Lac)

Immunology:

Marks: (16+4)=20

Unit –1: Plant health management.

Unit –2: Immunity & resistant in mammals, principle of antigens and Antibodies reaction.

Unit–3: Interaction of plants with bacteria, virus and fungi; breeding for disease resistance, environment & immunity, laws in the distribution of immunity from infectious diseases in plants.

BOTANY MAJOR BOTMT-604

48 End+12 IA=60

Biophysics and Bioinformatics:

Objective of the course: The main objective of this course is to introduce the students with the tools and techniques of physical and computer sciences used in biological study.

Biophysics

Marks: (24+6)=30

Unit –1: Scope and development of Biophysics. P^H and buffer solution in details.

Unit –2: Laws of Thermodynamics, Concept of Free Energy, Redox Potential and Bioenergetics(only high energy compound)

Unit–3: X-ray Crystallography (XRD), Chromatography, LASER and its biological applications, Fluorescence and its application, Basic concept of NMR and Ultra Sound

Unit –3:Isotopes, Types, their importance in biological studies, measure of radioactivity.

Bioinformatics:

Marks: (24+6)=30

Unit-1: Fundamentals of bioinformatics: introduction, history and scope of bioinformatics; sources of information, internet world wide web and web browsers.

Unit-2: Biological database: introduction, basic concepts of primary and secondary databases; Nucleic acid and protein sequence database (NCBI, gene bank and SWISS-PROT); Data mining and data mining tools (ENTREZ).

Unit-3. Database search and sequence alignment, Tools of sequence alignment – FASTA and BLAST; methods of sequence alignment.

Unit-4: Phylogenetic analysis: basic concept, steps in evaluation of phylogeny and constructing phylogenetic trees.

BOTANY MAJOR BOTMP- 605

Marks: 80(52End+13IA), Project work 15

A. Molecular Biology and Immunology

1. Preparation of ball and stick model of Nucleolides.
2. Detection/Estimation of RNA/DNA
3. Study of antimicrobial activity (inhibition zone) of various plant extract of economic importance.

B. Biophysics and Bioinformatics:

1. Application of different microscopes in biological studies.
2. Separation techniques.
3. Different e-resources and database search.
4. Similarity search in sequence such as BLAST / FASTA.
5. Submission of charts and models etc.

*****PROJECT WORK:** **Topic of the Project work may be given in the Semester-V and report should have scientific investigation and outcome with statistical analysis of data (where necessary). The same have to be presented in the headings: Title, Introduction, Objective, Materials & Methods, Results, Conclusion and References. The project will be evaluated in Semester-VI with the paper BOTMP-605. Separate project preferably be given to each student.*

SCHEME OF THE PRACTICAL EXAMINATION:

Time: 6 hrs.	Marks: 52+15=67
1. Molecular Biology	12
2. Immunology	8
3. Biophysics	10
4. Bioinformatics	10
5. Practical record book	7

6. Viva-Voce		5
	Total	52
***Project		15

		67

**BOTANY MAJOR
BOTMT- 606**

48 End+12 IA=60

Agrotechnology and Sustainable Utilization of Plants:

Objective of the course: The main objective of this course is to provide students comprehensive knowledge of usefulness of plant resources for human welfare.

Unit -1: Origin of cultivated plants, Vavilov's centre of origin of crop plants; ethnobotany and its importance in Indian context, Knowledge on Indigenous Knowledge System (IKS)

Unit – 2: Agrotechnology of rice, wheat, mustard, sunflower, sesume, groundnut, soyabean, gram, mung, pea, tea, coffee, potato, cabbage, cauliflower, tomato and their economic utilization

Unit – 3:Agrotechnology of Chilli, turmeric, zinger, cardamom, black piper, jute, cotton, ramie, bamboo, teak, sal, sisoo, ajar, nahar and their economic utilization.

Unit – 4:Medicinal importance of sarpagandha, ashwagandha, kalmegh, satmul, bos, giloi (Tinospora), bhot jalakia, amlakhi, arjun, silikha and their economic utilization .

Unit – 5: Aromatic and Petrocrops(Cultivation and economic utilization) of patchouli, citronella, vitivar, sasi, jatropha, era.

Unit – 6: Domestication of Plants; Germplasm Collection & Conservation, Importance of Germplasm of Wild Species:Gene Library, Gene Bank; Concept of , Biofertilizers, biopesticides and Organic farming; Useful aspect of Lower Group of Plants: Algae, Fungi, Lichen.

**BOTANY MAJOR
BOTMP- 607**

Marks: 40(32End+8IA)

1. Determination of soil pH , Soil Moisture, Water Holding Capacity (WHC)of different soil samples collected from different habitats and soil physical properties.
2. Study of botanical characteristics, useful part (s), and products.
3. Determination of protein, fat, oil content of certain materials.
4. Collection of useful plants/plant parts.

**SCHEME OF THE PRACTICAL EXAMINATION:
(End Semester)**

Time: 4 hrs.	Marks:32
1. Soil analysis	10
2. Spot identification of useful plant / plant part(s) of different categories with distinguishing characters to be selected by the External Examiner.	12
4. Practical record book	5
5. Viva-Voce	5
Total	32

Books Recommended (including text books):

Cryptogamic Botany Vol I & II: Smith, Tata McGraw Hill.
 Introduction to lower plants: Round, Bultherworth.
 Morphology of Gymnosperms: Coulter & Chamberlein.
 Plant Anatomy: Basu, Willey.
 Introduction to Embryology: P. Maheswari.
 Introduction to Plant Taxonomy: Jeffrey, Churcil.
 Int. to Plant Physiology: Meyer & Anderson, East West.
 A Class Book of Botany: A.C. Dutta.
 Modern Concept of Ecology: Kumer, Vikash.
 Cell Biology: S.C. Rastogi, Rastogi Publication.
 General Microbiology Vol. I & II: Power & Daginaqala, Himalayan Publishing House.
 Economic Botany: Hill, McGraw Hill.
 Genetics: Winchester, Oxford & IBH.
 Fungi & Plant Diseases: Mundkar, Macmillan.
 Int. to Plant Physiology: Curtis & Clarke, McGraw Hill.
 Plant Pathology: Butter & Jones, Macmillan.
 Taxonomy of Vascular Plants: Lawrener, Macmillan.
 An Int. to Gymnosperms: S.C. Dutta, Asia Publishing House.
 The Primitive Land Plants: Bower, Macmillan.
 Fundamentals of Ecology: Odum, W.B. Saunders.
 Elements of Cytology: Cohen, Harcourt.
 Morphology and Taxonomy of Fungi: Bessey, Vikash.
 Morphology of Vascular Plants: Eames, Tata McGraw Hill.
 Introductory Mycology: Alexopolous, Willey.
 Plant Physiology Vol. I & II: Steward, Academic Press.
 Families of Flowering Plants Vol. I & II: Hutchinson, Macmillan.
 Plant Diseases: R.S. Singh, Oxford Hill.
 Fundamentals of Biostatistics: Prasad, Emkay Publication.
 An Int. to Taxonomy of Angiospers: Shukla & Mishra, Vikash.
 College Botany Practical Vol. I & II: Santra, Chatterjee & Das, Central Book.
 College Botany: Das Ganguly, Central Book.
 Economics Botany in tropics: Kochar, Macmillan.
 Concepts of Cell Biology: Verma & Agarwal, H. Chand.
 Industrial Microbiology: Patel, Macmillan.
 Principles of Soil Science: Rai, Macmillan.
 Text Book of Pteridophytes: Sharma, Macmillan.
 Genetic Engineering: Mitra, Macmillan.
 Genetics: Ahluwalia, Willey.
 Elementary Principles of Plant Breeding: Chaudhury, Oxford & IBH.
 Plant Breeding: Chopra, Oxford & IBH.

Genetics: Gardener.
 Principles of Genetics: Stickberger.
 Essentials of Genetics and Biotechnology: A.C.Gogoi
 Molecular Cytogenetics: Sinnoll, Dunne & Donbzhosky.
 A Text Book of Plant Ecology: R. S. Amharst.
 Population Ecology: M. Begon & M. Mortimer.
 Fundamentals of Ecology: M.C. Dogh.
 The Reproductive capacity of plants: E.J. Salisbury.
 Introduction to Environmental Management: Nag Choudhury.
 Environmental Biology: Trivedi & Raj.
 Microbiology: N.J. Pelczar et. al.
 General Microbiology: R.Y. Stainer et. al.
 Soil Microbiology: N. Walker.
 Molecular Viscosity: G.A. Knight.
 Petroleum Microbiology: R.M. Atlas.
 Agricultural Microbiology: Rangaswamy and Bhagyaraj.
 Biotechnology: Trichan.
 Microbial Genetics: Treifelder.
 Modern concept of Ecology: Verma & Agarwala
 Handbook of Agriculture: ICAR
 Economic Botany: Pandey
 A Handbook of Medicinal Plants: Prajapati; Sharma, Kumar, Purohit
 Medicinal Plants of N.E. India: NEDFI
 Cultivation of Medicinal Plants: Purohit & Vyas.
 Essentials of Genetics and Biotechnology:A.C.Gogoi, Anuradha Publication, Jorhat
 Fundamentals of Cell and Molecular Biology: Arvind K. Misra, Panima Publishing Corpn. New Delhi/Bangalore

DEPARTMENT OF LIFE SCIENCES: DIBRUGARH UNIVERSITY

UG SYLLABUS UNDER SEMESTER SYSTEM BOTANY GENERAL PROGRAMME

OUTLINE OF THE SYLLABUS

Semester-I 400 Marks

Compulsory course I: English-I	100=(80+20)
Non-major Course I: BOTGT-101: Algae, Fungi, Bacteria, Lichen, Virus, Plant Pathology : BOTGP-102:(Practical based on BOTGT-101)	48 End+12 IA 32 End+8 IA
Non-major Course II: Chemistry -I (Th)	100=(80+20)
Non-major Course III: Zoology -I (Th)	48 End+12 IA