



**Darrang College
(Autonomous),
Tezpur-784001**

**Syllabus for
FYUGP
Botany
(Minor)**

Approved by :

**Board of Studies meeting held on 30th July, 2025
&**

Academic Council vide Resolution no. 04, dated- 12/08/2025

Course Structure Detail syllabus of
1st semester Botany : Minor
BOT-MN-01014
Plant and Microbial Diversity

Aims of FYUGP in Botany: The primary aim of the Four Year Undergraduate Programme (FYUGP) is to provide a holistic and flexible approach to Botany as a subject in career option fostering well-rounded individuals with a strong foundation in the subject. It aims to equip students with practical skills, critical thinking abilities, and a multidisciplinary perspective, preparing them for diverse career paths and further academic pursuits.

Program Outcome: On successful completion of the course, students will have:

1. Knowledge with the concept of different kingdoms and the theories behind how life began.
2. Basic understanding of the characteristics, distribution, classification, reproduction, and current status of various microbial and plant communities.
3. Good understanding of virus, algae, fungus, bryophyte, and pteridophyte cell structures, dicotyledonous and monocotyledonous leaf venation patterns, and inflorescence and fruit features.
4. Knowledge to identify various groups of organisms in the laboratory through morphological analysis.

Teaching learning process : Lecture, Tutorial, Practical's & Assignment

Teaching Learning tools: Lecture, use of ICT tools, laboratory experiments

Evaluation/ Assessment : Sessional Examinations, Internal Assessment, Home Assignments , Attendance, End term examinations

Title of the course	Plant and Microbial Diversity
Course code	BOT-MJ/MR-01-01-60
Total Credit (theory +practical)	4 (THEORY: 03; PRACTICAL: 01)
Contact hours	75 (THEORY 45; PRACTICAL : 30)
No. Of Required Classes	75 (THEORY 45; PRACTICAL : 30)
Distribution of Marks	Refer the table below

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Standard Template for Syllabus

Title of the course	Plant and Microbial Diversity
Course outcomes	1. This paper will explain the origin of life, the diversity of Bacteria, Viruses, Algae, Fungi & Lichen, Bryophytes, Pteridophytes, Gymnosperms, and Angiosperms on the planet, and how they may be related to each other. The emphasis will also be on the hands- on approach and laboratory techniques for identification of the plant and microbial groups using various morphological features.

Unit	Content	Lecture	Marks	Tutorial	Total Hours
Unit 1	Origin of Life: Theories of Origin of Life, Concept of Kingdom	2	4	1	3
Unit 2	Bacteria & Viruses: Bacteria: General Features, Bacterial Cell Structure , Types of Bacteria, Reproduction (Conjugation, Transformation & Transduction). Introduction to Archaeobacteria; Economic Importance of Bacteria Virus: General features, Reproduction, Life Cycle (Lytic & Lysogenic); RNA Viruses (TMV), DNA Virus (CMV)	8	10	4	12
Unit 3	Algae: General Features, Cell Structure, Range of Thallus Structure and Photosynthetic Pigmentation in Algae. Reproduction, Classification (F.E. Fritch, 1945). A brief account of : <i>Nostoc</i> , <i>Chlamydomonas</i> , <i>Volvox</i> , <i>Spirogyra</i> , <i>Chara</i> . Economic importance of Algae	6	10	3	9

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Unit	Content	Lecture	Marks	Tutorial	Total Hours
Unit 4	Fungi: General Features (Distribution, Morphology, Nutrition) Reproduction & Classification (Einsworth, 1973). A brief account of: <i>Mucor</i>, <i>Penicillium</i>, <i>Agaricus</i>. A brief idea of Fungi <i>imperfecti</i>. Economic importance of Fungi Lichen: General account of Lichen (Distribution, Morphology & Types) Reproduction & Economic Importance	7	12	3	11
Unit 5	Bryophytes: General features (Distribution & Morphology, Alternation of Generation) Adaptation to land habit, Classification and Evolutionary Trends. A Brief Account of : <i>Marchantia</i> & <i>Funaria</i> Pteridophytes: General features (Distribution & Morphology, Alternation of Generation); <i>Reproduction</i>, <i>Classification</i>, <i>Stellar Diversity & Evolution</i>, <i>Heterospory & Seed habit</i>. A brief account of : <i>Lycopodium</i>, <i>Selaginella</i> & <i>Peteris</i>	10	12	5	15
Unit 6	Gymnosperms: General features (Distribution & Morphology, Alternation of Generation) Classification; Evolutionary trends and affinities. A brief account of : <i>Cycas</i> & <i>Gnetum</i> Angiosperm: General features, Concept of an artificial (Carrollus and Linnaeus, Natural (Bentham & Hooker upto Series) and phylogenetic system (Takhtajan upto Sub class) of classification. Floral Structures and Inflorescence. A Brief account of : Lamiaceae & Orchidaceae	12	12	6	16

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Unit	Content	Lecture	Marks	Tutorial	Total Hours
9	PRACTICAL [Credit: 01]				
	1. Study of structure of TMV and Bacteriophage (electron micrographs/ models).	2	4	NA	2
	2. Study of morphology of <i>Nostoc</i> , <i>Chalydomonas</i> , <i>Volvox</i> , <i>Spirogyra</i> , <i>Chara</i> (Temporary preparation of slides).	4	4		4
	3. Study of <i>Mucor</i> , <i>Penicillium</i> , <i>Agaricus</i> (Temporary preparation of slides)	4	5		4
	4. Study of vegetative and reproductive parts of <i>Marchantia</i> and <i>Funaria</i> (preparation of slides).	4	6		4
	5. Study of <i>Lycopodium</i> / <i>Selaginella</i> (morphology, strobilus, and spores), <i>Adiantum</i> / <i>Pteris</i> (morphology).	6	6		6
	6. Study of <i>Cycas</i> / <i>Pinus</i> and <i>Gnetum</i> (morphology, leaf/ needle, megasporophyll and microsporophyll)	6	5		6
	7. Study of leaf venations in dicots and monocots (at least two specimens each)	2	5		2
	8. Study of different types of inflorescences and fruits.	2	5		2

Reading list:

1. Bhatnagar SP, Moitra A (1996) Gymnosperms. New Delhi, Delhi: New Age International (P) Ltd Publishers.
2. Campbell NA, Reece JB (2008) Biology, 8th edition, Pearson Benjamin Cummings, San Francisco.
3. Evert RF, Eichhorn SE (2012) Raven Biology of Plants, 8th edition, New York, NY: W.H. Freeman and Company.
4. Ingrouille M, Eddie B (2006) Plants: Evolution and Diversity. Cambridge University Press.
5. Kumar HD (1999) Introductory Phycology, 2nd edition. Delhi, Delhi: Affiliated EastWest. Press Pvt. Ltd.
6. Parihar NS (1991) An Introduction to Embryophyta. Vol. II. Pteridophytes. Prayagraj: U.P.: Central Book Depot.

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7. Pelczar MJ (2001) Microbiology, 5th edition. New Delhi, Delhi: Tata McGraw-Hill Co.
8. Puri P (1985) Bryophytes. New Delhi, Delhi, Atma Ram and Sons.
9. Sethi IK, Walia SK (2018) Text book of Fungi and Their Allies. 2nd Edition, Med tech Publishers, Delhi.
10. Singh G (2019) Plant Systematics: An Integrated Approach. 4th edition. CRC Press, Taylor and Francis Group. 3
11. Singh V, Pandey PC, Jain DK (2001) A Text Book of Botany. Meerut, UP: Rastogi and Co.
12. Tortora GJ, Funke BR, Case CL (2007) Microbiology. San Francisco, U.S.A: Pearson Benjamin Cummings.
13. Vashishta PC, Sinha AK, Kumar A (2010) Pteridophyta. New Delhi, Delhi: S. Chand & Co Ltd.
14. Webster J, Weber R (2007) Introduction to Fungi. Cambridge, Cambridge University Press.

Particulars of Course Designer:

1. Dr Sanjay Deka, HoD, PG Department of Botany : Chairman
2. All faculty members of the PG Department of Botany as members of Board of Studies.

Course Structure
Detail syllabus of 2nd Semester
Botany (Minor)
BOT-MN-02014
Cell Biology & Biomolecules

Program Outcome : On successful completion of the course, students will have:

1. Able to obtain knowledge of structure, classification, and physicochemical properties of biomolecules and enzymes.
2. Detailed knowledge of the structure, properties, and functions of a cell and its components.
3. Acquainted with practical knowledge of properties of cell and cell membranes, DNA staining techniques, and microscopy of the plant cell.
4. Able to identify various biomolecules in the laboratory by qualitative tests of biomolecules.

Teaching learning process : Lecture, Tutorial, Practicals & Assignment

Teaching Learning tools: Lecture, use of ICT tools, laboratory experiments

Evaluation/ Assessment : Sessional Examinations, Internal Assessment, Home Assignments , Attendance, End term examinations

Course Objective: This paper will explain biomolecules, the basic building blocks of living organisms, with a focus on their structural organization, molecule properties, biological roles, and functions. The emphasis will be on the relationship between the structure and function of various biomolecules at the chemical level with a biological perspective, as well as a hands-on approach and laboratory techniques.

Title of the course	Cell Biology & Biomolecules
Course code	BOT-MJ/MR-02-01-60
Total Credit (theory +practical)	4 (THEORY: 03; PRACTICAL: 01)
Contact hours	75 (THEORY 45; PRACTICAL : 30)
No. Of Required Classes	75 (THEORY 45; PRACTICAL : 30)
Distribution of Marks	Refer the table below

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Title of the course	Cell Biology & Biomolecules
Course outcomes	1. The core aim of cell biology is to understand the structure, function and behaviour of cells, the fundamental units of life. Simultaneously, the study of biomolecules explores the molecules that make up cells and carry out essential biological processes. By understanding both, it is an aim to unravel the complexities of life, from individual cellular mechanisms to the overall workings of organisms.

Unit	Content	Lecture	Marks	Tutorial	Total Hours
Unit 1	Introduction to cell: Cell theory, Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory); Cytoskeleton, Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle.	8	12	4	12
Unit 2	Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of cell membranes; Membrane transport – Passive, active and facilitated transport.	6	12	3	9
Unit 3	Cell organelles: Nucleus: Structure-nuclear envelope, Organization of chromatin, Nucleolus, Ribosome, Chloroplast, Mitochondria, Peroxisomes, Endoplasmic Reticulum, Golgi Apparatus, and Lysosomes.	9	8	4	13
Unit 4	Carbohydrates and Lipids: Carbohydrates: Nomenclature and classification. Polymers of carbohydrate, Lipids: Definition and major classes of storage and structural lipids; Structure, properties and functions of Essential fatty acids.	9	8	4	13

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Unit	Content	Lecture	Marks	Tutorial	Total Hours
Unit 5	Aminoacids and Proteins: Structure and classification of amino acids; Levels of protein structure (primary, secondary, tertiary, and quaternary); Protein denaturation and biological roles of proteins.	8	10	4	12
Unit 6	Nucleic acids: Chemistry of Nucleic Acids; Structure and function of nucleotides & nucleosides; Types of nucleic acids; Structure of A, B, Z types of DNA	5	10	3	8
9	PRACTICAL [Credit: 01]				
	1. Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins.	8	10	NA	8
	2. Study of plant cell structure with the help of epidermal peel mount of Onion/ Rhoeo/ Crinum.	3	5		3
	3. Demonstration of the phenomenon of protoplasmic streaming in <i>Hydrilla</i> and <i>Vallisneria</i> leaf.	3	5		3
	4. Counting the cells per unit volume with the help of haemocytometer. (Yeast/ pollen grains).	4	5		4
	5. Cytochemical staining of: DNA-Feulgen and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	6	6		6
	6. Study different stages of mitosis and meiosis.	6	9		6

Reading list:

1. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H. Freeman and Company.
2. Campbell MK (2012) Biochemistry, 7th Edition. Published by Cengage Learning
3. Campbell PN, Smith AD (2011) Biochemistry Illustrated, 4th Edition, Published by Churchill Livingstone.
4. Cooper GM, Hausman RE (2009) The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Hardin J, Becker G, Skliensmith LJ (2012) Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th Edition.
6. Karp G (2010) Cell Biology, John Wiley & Sons, U.S.A. 6th Edition.
7. Nelson DL, Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company.
8. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd Edition, W.H. Freeman.

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Particulars of Course Designer:

1. Dr Sanjay Deka, HoD, PG Department of Botany : Chairman
2. All faculty members of the PG Department of Botany as members of Board of Studies.