

Four-year Undergraduate Programme
Subject: Botany
Semester: First
Major 1
Course Name: *Plant and Microbial Diversity*
Course Level: 100-199, and subsequent level as per NEP structure

THEORY [Total marks: 60] Credit: 03; Total No. of classes: 45			
Unit no.	Unit content	No. of classes	Marks
Unit 1	Origin of life: Theories of the Origin of Life, Concept of Kingdoms, and Tree of Life	3	4
Unit 2	Bacteria and Viruses: Bacteria: General features, cell structure, reproduction, conjugation, transformation, and transduction; introduction to Archaeobacteria Viruses: General features, replication, reproduction (Lytic and Lysogenic life cycles), RNA virus (TMV), DNA virus (Cauliflower Mosaic Virus).	8	10
Unit 3	Algae: General features, cell structure, range of thallus structure, reproduction, and classification; a brief account on <i>Nostoc</i> , <i>Oedogonium</i> , and <i>Chara</i>	6	10
Unit 4	Fungi & Lichens: General features, distribution of fungi and its current status in the living world, reproduction, and classification (Anisworth, 1973); a brief account of <i>Mucor</i> , <i>Ascobolus</i> , and <i>Agaricus</i> ; a brief account on lichens: structure, types, and economic importance	7	12
Unit 5	Bryophytes and Pteridophytes: Bryophytes: General features, adaptation to land habits, classification, and evolutionary trends; a brief account on <i>Marchantia</i> and <i>Polytrichum</i> Pteridophytes: General features, classification, reproduction, evolutionary trends (stellar evolution), and affinities; a brief account on <i>Lycopodium</i>, <i>Selaginella</i>, and <i>Pteris</i>	10	12
Unit 6	Gymnosperms and Angiosperms: Gymnosperms: General features, classification, reproduction, evolutionary trends, and affinities; a brief account on <i>Cycas</i>, and <i>Gnetum</i> Angiosperms: General features, Concept of an artificial, natural, and phylogenetic system of	11	12

	classification. Floral parts and inflorescence; Brief accounts on Lamiaceae and Orchidaceae		
PRACTICAL [Credit: 01]			
1. Study of structure of TMV and Bacteriophage (electron micrographs/models). 2. Study of morphology of <i>Nostoc</i>, <i>Oedogonium</i>, <i>Chara</i> (Temporary preparation of slides). 3. Study of <i>Mucor</i>, <i>Ascobolus</i>, <i>Agaricus</i> (Temporary preparation of slides) 4. Study of vegetative and reproductive parts of <i>Marchantia</i> and <i>Polytrichum</i> (preparation of slides). 5. Study of <i>Lycopodium</i>/ <i>Selaginella</i> (morphology, strobilus, and spores), <i>Adiantum</i>/ <i>Pteris</i> (morphology). 6. Study of <i>Cycas</i>/ <i>Pinus</i> and <i>Gnetum</i> (morphology, leaf/ needle, megasporophyll and microsporophyll) 7. Study of leaf venations in dicots and monocots (at least two specimens each) 8. Study of different types of inflorescences and fruits.	30	40	

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 East-West. Press Pvt. Ltd.
6. Parihar NS (1991) An Introduction to Embryophyta. Vol. II. Pteridophytes. Prayagraj: U.P.: Central Book Depot.
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.
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.

Graduate Attributes

Course Objective:

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.

Course outcomes:

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.

Theory Credit: 03

Practical Credit: 01

No. of Required Classes: 75 (Theory: 45; Practical: 30)

No. of Contact Classes: 75 (Theory: 45; Practical: 30)

No. of Non-Contact Classes: Nil

Particulars of Course Designer (Name, Institution, email id):

CCS, Department of Botany
Gauhati University, Guwahati-14