

**SEMESTER - I**

Course Type: Major

Course Code: UBOTMAJ11001

Course Name: Origin of Life and Plant Diversity

Credits: 4 (Theory-3, Practical-1)

Full Marks: 75 (Theory-40, Practical-20, Continuing Evaluation-10, Attendance-5)

**Brief Course Description:**

UBOTMAJ11001 deals with the Origin and Evolution of life and imparts basic knowledge about plants and related life forms. It thoroughly establishes the relationship of plants with other kingdoms of life. Also, it emphasizes the huge diversity of known plant life, along with an idea of the fossil record and geological time scale.

**Prerequisite(s) and/or Note(s):**

- (1) High School Biology.
- (2) Note(s): Syllabus may be modified after and not during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

**Course Objectives:****Knowledge acquired:**

- (1) Origin and evolution of Life
- (2) Introduction to plant and other life forms
- (3) Different groups of plants.

**Skills gained:**

- (1) Handling microscopy, staining and mounting of plant specimens, and,
- (2) Methods of collection, identification and preservation of plant specimens.

**Competency Developed:**

- (1) Schematic knowledge of collection and subsequent plant specimens.
- (2) Proper arrangement of preserved plant specimens.
- (3) Choosing suitable staining and mounting protocols for study of plant specimens.

**THEORY****Total Lectures: 45****Unit-1: Origin of life****(8 lectures)**

Origin of life: Oparin's hypothesis, Haldane's hypothesis, Miller-Urey experiment, Panspermia, origin of cells and the first organisms: the concept of prebiotic soup and coacervates.



**Unit-2: Evolution****(7 lectures)**

Fossil records: Geological time scale – major events in each era; Evidences of evolution; theories of evolution - Lamarck, Wallace, Charles Darwin, Hugo De Vries; Neo-Darwinism – major postulates - isolation, mutation, genetic drift, and speciation; the role of extinction in evolution.

**Unit-3: Classification of life forms****(10 lectures)**

Diversity of life: Prokaryotes and eukaryotes; unicellularity and multicellularity; Two kingdom classification (Carolus Linnaeus, 1735); phylogenetic classification (August W Eichler, 1878); Three kingdom classification (Ernst Haeckel, 1866); Four kingdom classification (H F Copeland, 1938); Five kingdom classification (R H Whittaker, 1969); Six kingdom classification (Thomas Cavalier-Smith, 1998); Seven kingdom classification (M A Ruggiero, 2015); Three domains (Carl Woese, 1990) – criteria for classification, general characters.

**Unit-4: Introduction to plant kingdom****(10 lectures)**

General features of plants; Basic knowledge of thallophytes, archegoniates, and spermatophytes; Basic structure and function of plant organs - roots, stem and leaves, vascular bundle; Introduction to mesophytes, hydrophytes, and xerophytes; Concept of alternation of generations; colonization of land by plants; origin of embryophytes and flowering plants.

**Unit-5: Plant diversity****(10 lectures)**

Introduction to ICN and the status of algae and fungi; Diversity of plants: study of the salient features and economic importance of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms; Encyclopaedia of Life.

**Practical**

1. Study of light microscope: simple and compound.
2. Preparation of specimens for light microscopy – Collection, fixation, and preservation of plant specimens; Whole mounts and sections – hand sectioning.
3. Study of prokaryotic and eukaryotic cells.
4. Demonstration of basic staining techniques of plant tissues.
5. Study and demonstration of mounting techniques.
6. Collection and identification of plant specimens from diverse groups.
7. Morphological variations in roots, stems, leaves /equivalent organs across different plant groups.
8. Study of conducting elements in different plant groups through photographs/permanent slides.
9. Study of reproductive structures in different plant groups through photographs/ permanent slides.

**Suggested Readings**

1. Brian K. Hall and Benedikt Hallgrímsson, 2013. Strickberger's Evolution (Fifth Edition). Jones and Bartlett Publishers.

2. Eldon D Enger, Frederick C Ross, David B Bailey, 2011. Concepts in Biology (Fourteenth Edition). Tata McGraw Hill.
3. Gerald Audesirk, Teresa Audesirk, Bruce E Byers, 2019. Biology: Life on earth. (Twelfth Edition). Pearson.
4. James D Mauseth, 2019. Botany: An Introduction to Plant Biology. Jones & Bartlett.
5. Kenneth A Mason, Jonathan B Losos, Tod Duncan, 2017. Biology (Twelfth Edition). McGraw Hill.
6. Lisa A Urry, Michael L Cain, Steven A Wasserman, Peter V Minorsky, Rebecca B Orr, 2021. Campbell Biology (Twelfth Edition). Pearson.
7. Michael G Simpson, 2019. Plant Systematics (Third Edition). Academic Press.
8. Peter Raven, George Johnson, Kenneth Mason, Jonathan Losos and Tod Duncan, 2023. Biology (Thirteenth Edition). McGraw Hill.
9. Prasad M K, Krishna Prasad M, 2000. Outlines of Microtechnique. Emkay Publishers, New Delhi.
10. Scott Freeman, Kim Quillin, Lizabeth Allison, Michael Black, Greg Podgorski, Emily Taylor, and Jeff Carmichael, 2019. Biological Science. Pearson.
11. Sylvia S Mader and Michael Windelspecht, 2022. Biology (Fourteenth Edition). McGraw Hill.
12. Timothy Walker, 2012. Plants: A Very Short Introduction. Oxford.