Program	BS Botany	Course Code	Bot-205	Credit Hours	2
Course Title	**Plant Anatomy and Embryology (Theory)**				

Introduction

This course introduces the internal structure of vascular plants, including their cells, tissues, organs and systems. It emphasizes the variation in the appearance and description of plant parts based on developmental and functional aspects. The relationship of structures with their possible functions is also elucidated. It also accentuates the acquaintance regarding embryology i-e development of sporangia, gametophytes, embryos and endosperms in the land plants. The laboratory-based microscopic assays of the stained plant specimen sections are also included for understanding plant structures *i-e* vegetative and reproductive.

Learning Outcomes

On the completion of the course, the students will be:

- familiarized with the internal organization of plant tissues.
- able to learn about role of different cells and tissues in plant development, as well as, its importance in various plant with respect to basic and applied aspects of plant anatomy.
- able to describe pollen formation and morphology to shape, megaspore formation, pollen pistil interaction and relationship between embryo and endosperm.
- able to conceptually integrate organismal structure and function having acquaintance with early development of
- plant organs from embryonic level.

Course Contents

Introduction of plant Anatomy

- The plant body and its development; fundamental parts of the plant body, internal organization.
- Study of different tissue systems of primary and secondary body.

Types of Tissues: Meristematic, permanent, complex and special / glandular tissues

- Meristematic Tissues: classification, cytohistological characteristics, initials and their derivatives. Apical meristem; Delimitation, different growth zones, evolution of the concept of apical organization.
- Theories of Shoot and Root Apical Organization
- Permanent Tissues: Introduction
- Types of permanent tissues: Parenchyma, Collenchyma, Sclerenchyma
- Complex Tissues: Xylem Tissue and Phloem tissue
- Special / Secretary Tissues
- Secretory tissues; Laticifers (classification, distribution, development, structural characteristics, functions) and Resin Canals.

Types of Tissue Systems:

- The Epidermal tissue system
- Origin, structure, development, functional and evolutionary specialization
- Ground or fundamental tissue system
- comparison between monocotyledons and dicotyledons with respect to cortex, pericycle and medulla or pith
- Vascular tissue system
- Types of vascular bundles
- Stele

Internal structure of stems, roots and leaves

- Internal structure of dicotyledonous and monocotyledonous Stem 2.10.2 Nodal anatomy
- Internal structure of dicotyledonous and monocotyledonous Root
- Root-Shoot transition
- Internal structure of dicotyledonous and monocotyledonous Leaves with special reference to mesophyll, venation, bundle-sheaths and bundle-sheath extensions

The Secondary Growth

- Secondary growth in dicot Stem by Vascular cambium, Fusiform and Ray initials, Annual / growth Rings, porous and non-porous wood, heart wood and sap wood, tyloses.
- Secondary growth in dicot Stem by cork cambium, Phellogen, Phellem and Phelloderm, Bark, Lenticels
- Secondary growth in dicot Root by Vascular cambium and cork cambium

Anomalous Secondary Growth in Stem

Secondary Growth in Monocotyledons

Introduction of reproductive part of plants

- Anatomy of reproductive parts; Flower, Seed, Fruit

Plant Embryology, Introduction, history and scope

Induction of flowering; flower as a modified determinate shoot. Structure of Microsporangium and Megasporangium Structure and development of male and female gametophyte

- Pollination: Self and cross pollination, Pollination in Different plants.
- Concept of Double fertilization.
- Endosperm.
- Types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.
- Seed-structure (Dicot and Monocot), Appendages and dispersal mechanisms.
- Apomixis and Polyembryony