

**Common Course Number:** BOT -1010

**Course Title:** General Botany

**Catalog Course Description:**

A survey of the plant kingdom based on a detailed study of the morphology, anatomy and physiology of selected representative specimens.

**Credit Hours Breakdown:** 3 lecture hours

**Prerequisite:** None

**Corequisite:** BOT-1010-L with a minimum of a grade of C

**Course competencies:**

**Competency 1: Introduction to Plants**

Upon successful completion of this course, the student will be able to demonstrate an understanding of the basic characteristics of a plant and the basic areas of plant study by:

- 1.1 Naming and explaining the basic vegetative features of a plant
- 1.2 Defining and understanding the basic fields of botany.
- 1.3 Discussing the identification, classification and naming of plants

## Competency 2: Simple Biochemistry

Upon successful completion of this course, the student will be able to understand the make up of the basic macromolecules of life: Carbohydrates, lipids, protein and nucleic acids by:

- 2.1 Listing the atoms present in each category of macromolecule.
- 2.2 Knowing the specific monomers that make up each category of macromolecule-polymers
- 2.3 Understanding some of the basic functions of each macromolecule category.

## Competency 3: Structure of Cells and Tissues

Upon successful completion of this course, the student will be able to understand the botanical concept of cell types that make up specific tissues of a generalized plant body by:

- 3.1 Listing the organelles present in a typical plant cell
- 3.2 Understanding the functions of each cell organelle
- 3.3 Recognizing the plant tissues and understanding their functions in the primary and secondary plant body.
- 3.4 Understanding the function of primary and secondary plant meristems

## Competency 4: Structure of Roots

Upon successful completion of this course, the student will be able to understand the structure, development and function of typical roots in monocot and dicot plants. In addition, the student will know the terminology, the major roots modifications and how they function by:

- 4.1 Describing the structure, development and function of the apical meristem and the 3 primary meristems in root tips.
- 4.2 Discussing the 4 zones of a root tip
- 4.3 Describing the differences between monocot and dicot roots
- 4.4 Discussing the functions of primary and secondary meristems
- 4.5 Discussing the absorption of water and minerals and mycorrhizal associations of roots
- 4.6 Describing the movement of water and minerals through the primary and secondary tissues in the root, stem and leaves.

### Competency 5: Structure of Leaves

Upon successful completion of this course, the student will be able to understand the anatomy and morphology of leaves and to understand basic types of modified leaves by:

- 5.1 Describing the structure and origin of a leaf
- 5.2 Describing the differences in anatomy between monocot, dicot and gymnosperm (pine) leaves.
- 5.3 Discussing the relationships and the functions of leaf cells to the tissues of the leaf
- 5.3 Describing the process of photosynthesis
- 5.4 Explaining how leaves have changed to respond to environmental and evolutionary pressures.

### Competency 6: Structure and growth of stems

Upon successful completion of this course, the student will be able to demonstrate an understanding of the structure, development and function of plant stems as well as major stem modifications by:

- 6.1 Describing the structure, development and function of the apical meristem and the 3 primary meristems at the stem tip.
- 6.2 Describing the differences between monocot and dicot stems
- 6.3 Discussing the functions of primary and secondary meristems
- 6.4 Differentiating between primary and secondary growth
- 6.5 Explaining the major stem modifications: bulb, corm, rhizome, stolon

### Competency 7: Structure of Flowers, fruits and seeds

Upon successful completion of this course, the student will be able to demonstrate an understanding of the development, structure and function of the flower along with the production of seeds in the ovary by:

- 7.1 Describing the development, structure and function of flower parts, fruits and seeds
- 7.2 Describing the major inflorescence types
- 7.3 Applying the collective names for all flower parts
- 7.4 Discussing the process of making eggs and sperm within the ovule and pollen grain
- 7.5 Describing double fertilization and explaining its significance
- 7.6 Discussing the development of an ovule to a seed from the zygote to fully developed embryo

#### Competency 8: Plant metabolism

Upon successful completion of this course, the student will be able to demonstrate an understanding of basic plant physiology by:

- 8.1 Describing water relations as concerning uptake of water by plant roots
- 8.2 Explaining the basic anabolic metabolism involving photosynthesis in chloroplasts
- 8.3 Explaining the basic catabolic metabolism involving cell respiration in mitochondria
- 8.4 Comparing photosynthesis and respiration as to raw materials and end products

#### Competency 9: Mitosis and meiosis and alternation of generations in the plant life cycle

Upon successful completion of this course, the student will be able to demonstrate an understanding of the processes of mitosis and meiosis, compare them, as understand the idea of alternation of generations (haploid and diploid) in the basic plant life cycle. The student will do this by:

- 9.1 Explaining in which specific tissues mitosis or meiosis occur.
- 9.2 Describing the products of mitosis and meiosis.
- 9.3 Explaining the distinction(s) between haploid, diploid and polyploid cells in plants
- 9.4 Explaining the alternation of the gametophyte and sporophyte plant bodies in the generalized and specific plant life cycles

### Competency 10: Genetics

Upon successful completion of this course, the student will be able to demonstrate an understanding of the basic principles of heredity in plants by:

- 10.1 Applying and describing the basic Mendelian Laws of heredity
- 10.2 Defining and applying the basic terms used in inheritance
- 10.3 Explaining monohybrid crosses and solving problems involving monohybrid inheritance
- 10.3 Explaining how meiosis and the processes on cross over and independent assortment provide genetic variations

### Competency 11: Evolution and Taxonomy

Upon successful completion of this course, the student will be able to demonstrate an understanding of the phylogeny in the living world starting with bacteria and finishing with flowering plants by:

- 11.1 Distinguishing between the three domains of life
- 11.2 Listing representative examples of all six kingdoms of life on earth
- 11.3 Explaining how virus particles are not considered alive but are obligate parasites which are specific to individual hosts in various kingdoms of life

### Competency 12: Survey of the plant Kingdom

Upon successful completion of this course, the student will be able to demonstrate an understanding of the phylogeny of the plant kingdom starting with bryophytes and finishing with angiosperms by:

- 12.1 Explaining the characters that distinguish all plant divisions/phyla.
- 12.2 Describing the life cycles in detail of bryophytes, pteridophytes and fern allies, gymnosperms and angiosperms