

University of Arkansas – Fort Smith
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General Syllabus

BIOL 10303 General Botany

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: BIOL 10043 Biological Science OR BIOL 20283 Introduction to Organismal Biology

Effective Catalog: 2018- 2019

I. Course Information

A. Catalog Description

Molecular, cellular and physiological aspects of botany, plant metabolic processes, and plant ecology are presented. The plant phyla are surveyed from an evolutionary perspective.

B. Additional Information

This course is intended primarily for majors, although it is also open to other students who have the prerequisite college course in biology. Emphasis is on a survey of the plant phyla, with particular concentration on physiology, morphology and evolution of plants.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Describe those characteristics of plants which distinguish them from animals, protists, fungi and prokaryotes.
2. Name the plant phyla and describe the general structure of a representative species of each.
3. Describe the major biochemical processes, such as photosynthesis and respiration, which occur in plant cells.
4. Name the life processes, and describe the typical mechanisms for carrying them out, in each phylum.
5. Define the biological terms used to describe plant structures and functions.
6. Discuss the major ecological and environmental relationships of plants.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will evaluate information gathered for and during the investigation. They will utilize critical thinking skills to solve problems and draw correct conclusions based on acquired data. Students will also review and study the primary literature for their research to improve their understanding.

Communication Skills (written and oral)

Students will communicate proficiently. They will compose coherent research documents appropriate to the intended audience. They will effectively communicate their research findings in a public or departmental setting.

III. Major Course Topics

- A. What is Plant Biology
 - 1. Relationship of Humans to their Environment
 - 2. Botany as a Science
 - 3. Diversification of Plant Study
- B. The Nature of Life
 - 1. Attributes of Living Organisms
 - 2. Chemical and Physical Basis of Life
- C. Cells
 - 1. Eukaryotic versus Prokaryotic
 - 2. Cell Structure and Communication
 - 3. Cell Reproduction
 - 4. Comparison of Animal and Plant Cells
- D. Tissues
 - 1. Meristematic Tissue
- E. Roots and Soils
 - 1. Root Development
 - 2. Root Structure
 - 3. Specialized Roots
 - 4. Mycorrhizae (mutualism)
 - 5. Root Nodules
 - 6 Soils
 - 7. Human Relevance of Roots and Soils
- F. Stems
 - 1. External Form of Woody Twig
 - 2. Origin and Development of Stems
 - 3. Tissue Patterns in Stems
 - 4. Specialized Stems
 - 5. Wood and Its Uses
- G. Leaves
 - 1. Leaf Arrangements and Types

2. Internal Structure of Leaves
3. Stomata
4. Mesophyll and Veins
5. Specialized Leaves
6. Autumnal Changes in Color
7. Abscission
8. Human and Ecological Relevance
- H. Flowers, Fruits, and Seeds
 1. Dicot and Monocot Differences
 2. Structure of Flowers
 3. Fruits
 4. Fruit and Seed Dispersal
 5. Seeds
- I. Water in Plants
 1. Molecular Movement
 2. Water Potential
 3. Water & Movement Through Plants
 4. Regulation and Transpiration
 5. Transport of Food Substances
 6. Mineral Requirements for Growth
- J. Growth and Development
 1. Enzymes and Energy Transfer
 2. Photosynthesis
 3. Respiration
 4. Additional Metabolic Pathways
 5. Assimilation and Digestion
 6. Nutrients, Vitamins, and Hormones
 7. Plant Movements
 8. Photoperiodism
 9. Temperature and Growth
 10. Dormancy and Quiescence
- K. Meiosis and Alternation of Generations
- L. Genetics and Molecular Biology
 1. Molecular Genetics
 2. Cytogenetics
 3. Mendelian Genetics
 4. Quantitative Traits
 5. Extranuclear DNA (Endosymbiont Hypothesis)
 6. Linkage
 7. Hardy-Weinberg
- M. Plant Breeding, Propagation, and Biotechnology
 1. Crop Plant Evolution
 2. Plant Breeding
 3. Plant Propagation
- N. Kingdom Fungi
 1. Distinctions Between Protista and Fungi

- 2. Kingdom Fungi
 - 3. Lichens
- O. Plant Kingdom: Bryophytes
 - 1. Introduction to Bryophytes
 - 2. Phylum Hepaticophyta
 - 3. Phylum Anthocerophyta
 - 4. Phylum Bryophyta: Mosses
- P. Seedless Vascular Plants
 - 1. Phylum: Psilotophyta – Whisk Ferns
 - 2. Phylum Lycophyta – Ground Pines, Spike Mosses, and Quillworts
 - 3. Phylum Equisetophyta – Horsetails and Scouring Rushes
 - 4. Phylum Polypodiophyta – Ferns
 - 5. Fossils
- Q. Seed Plants
 - 1. Gymnosperms
 - 2. Angiosperms