**BARTON COMMUNITY COLLEGE**

##### COURSE SYLLABUS

## GENERAL COURSE INFORMATION

Course Number: LIFE 1406

Course Title: Principles of Botany

Credit Hours: 5 Credit Hours

Prerequisites: LIFE 1402 Principles of Biology or its equivalent

Division/Discipline: Academic Division/Life Science

Course Description: This course focuses on the evolution, anatomy, and physiology of plants, and the vital roles they play in both the environment and in our lives. Students will gain an understanding of the unique cellular make up, morphology and function of plant tissues, as well as the metabolism, genetics, evolution, life cycles, classification, ecology, and economic importance of the plant kingdom and plant-related species. This course is intended primarily for students majoring in botany-related areas, such as Biology, Zoology, Wildlife Science, Forestry, Horticulture, Natural Resource Management, and similar fields of study.

1. **INSTRUCTOR INFORMATION**

## COLLEGE POLICIES

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

Plagiarism within any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is detrimental to the College's educational endeavors as outlined in the College catalog, Student Handbook, and College Policy & Procedure Manual. (Most up-to-date documents are available on the College webpage.)

Anyone seeking an accommodation under provisions of the Americans with Disabilities Act should notify Student Support Services via email at [disabilityservices@bartonccc.edu](mailto:disabilityservices@bartonccc.edu).

## COURSE AS VIEWED IN THE TOTAL CURRICULUM

Principles of Botany is an approved general education course at BCC, which can be used to fulfill degree requirements as a breadth laboratory science course in the natural/biological science. In addition, it is required (or recommended) to be taken by students enrolled in Biological Sciences, Wildlife Science, Horticulture Science, Agriculture, and pre-professional programs.

This course transfers well and may be used to help fulfill credit and course requirements for general education at all Kansas Regents institutions. However, general education requirements vary among institutions, and perhaps even among departments, colleges, and programs within an institution. Also, these requirements may change from time to time and without notification. **Therefore it shall be the student’s responsibility to obtain relevant information from intended transfer institution during his/her tenure at BCC to insure that he/she enrolls in the most appropriate set of courses for the transfer program.**

## ASSESSMENT OF STUDENT LEARNING

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

Course Outcomes, Competencies, and Supplemental Competencies:

* 1. Describe the Plantae kingdom and its levels of cellular organization.
     1. List the characteristics of the plant kingdom, and describe which characteristics are shared with one or more of the other biological kingdoms.
     2. Describe the organization of a plant cell, and list the function of each organelle.
     3. Compare and contrast the organization and structures in a plant cell with those found in a typical animal cell.
     4. Compare and contrast the pattern of development in plants and animals.
     5. Describe the function of the cell wall in terms of the preservation of the life of the plant cell, and the overall morphology of the plant.
  2. Describe the morphology, function, and relationships of stems, roots, leaves, and reproductive structures such as archegonia, antheridia, flowers, fruits, and seeds.
     1. Identify the three kinds of tissues in a vascular plant’s body, and state the function of each.
     2. Compare the structures of different types of roots, stems, and leaves, and relate the structures to their functions.
     3. State the type of reproductive structure(s) utilized by each plant phyla, and the amount of water and protection needed to ensure the success of that structure.
     4. List the evolutionary advantages of using seeds for reproduction.
  3. Describe plant bioenergetics including metabolism, energy, and enzymes involved in photosynthesis and cellular respiration.
     1. Distinguish between an autotroph and a heterotroph in terms of energy acquisition.
     2. Diagram the light-dependent reactions and explain what is taking place at each step of the process, including the role of pigments, thylakoid membranes, and enzymes.
     3. Diagram the light-independent reactions and discuss the role of carbon dioxide, ATP, NADPH, the cyclical nature of the reactants, and the end products.
     4. Compare and contrast C3 (Calvin cycle), C4, and CAM photosynthetic pathways, and describe the environmental conditions favoring each type.
     5. List the major factors that affect the rate of photosynthesis.
     6. Explain the process of aerobic cellular respiration, and the goals of carrying out this process in plants.
     7. Explain when anaerobic cellular respiration takes place in a plant cell and the types of resultant products.
  4. Explain how plants maintain the continuity of life, including mitosis, meiosis, alternation of generations, and plant life cycles.
     1. Diagram and explain the cell cycle that takes place in plants.
     2. Compare and contrast the cell plate formed in plants, with that of the cleavage furrow found in animal cells.
     3. Describe the process of meiosis in a plant cell, and the end products produced.
     4. Describe how alternation of generations functions in the plant kingdom, and how the dominant generation changed from the gametophyte to the sporophyte generation as the plant kingdom evolved.
     5. Compare and contrast the life cycles of liverworts/hornworts, mosses, ferns and their allies, gymnosperms, and angiosperms.
     6. Describe how plants are able to reproduce asexually, and the advantages and disadvantages of utilizing that form of reproduction.
  5. Explain the principles of Mendelian inheritance and molecular genetics.
     1. Differentiate between a monohybrid cross and a dihybrid cross, and how Mendel used garden peas to demonstrate these crosses.
     2. Explain Mendel’s Laws of Segregation and of Independent Assortment.
     3. Describe how plants are able to utilize polyploidy to diversify their genetic traits.
     4. Explain how plants are used in genetic engineering, and the benefits and drawbacks of using this technology.
  6. Describe the taxonomic classification scheme and how it is used in the identification of plants.
     1. Explain how the taxonomic classification schemes in the plant kingdom differ from that of other biological kingdoms.
     2. Describe the major characteristics of each of the phyla within the plant kingdom, with an emphasis on differences in vascular tissue, reproductive structures, dominant generation, and dependence on water.
     3. Distinguish between nonvascular plants and vascular plants.
     4. Describe how the production of seeds and flowers aided the success of plants.
  7. Describe the uniqueness, diversity, economic and ecological importance of algae, fungi, bryophytes, seedless vascular plants, gymnosperms, and angiosperms.
     1. Summarize how plants are adapted to living on land, and the characteristics that led to that success.
     2. Describe the role of the cuticle, stomata, and mycorrhizae in the success of plants in the terrestrial habitat.
     3. Explain the similarities between plants and algae, and between plants and fungi.
     4. Explain how plants are used in the field of medicine, the production of foods, fibers, and building materials, and other important economic uses of plants to humans.
     5. Describe plants’ roles in ecosystems, as well as their role in food chains/food webs.
  8. Demonstrate good laboratory technique and communication of the results.
     1. Follow written and oral instructions accurately.
     2. Work in a group setting safely and collaboratively, using scientific equipment carefully and correctly.
     3. Acquire data, and record visual observations by means of accurate diagrams and drawings.
     4. Correlate laboratory observations with knowledge of plant morphology and metabolism.
     5. Discuss laboratory results obtained in the context of the competencies identified above in outcomes A-G.

1. **INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS**

1. **TEXTBOOKS AND OTHER REQUIRED MATERIALS**

## REFERENCES

### METHODS OF INSTRUCTION AND EVALUATION

### Since laboratory activities are integral to the learning outcomes of this lab science course, students must pass the laboratory portion of the class in order to successfully complete (“pass”) the course.

### ATTENDANCE REQUIREMENTS

## COURSE OUTLINE