
CODE: BIOL 125

TITLE: Introduction to Plants

INSTITUTE: STEM

DEPARTMENT: Biology

COURSE DESCRIPTION: This course is intended to meet a laboratory science requirement for the non-science major, and is a required course in the Ornamental Horticulture Certificate Program. The student will become familiar with the structure and function of plant roots, stems, leaves, flowers, fruits and seeds. An understanding of plant diversity develops through the study of plant evolution and classification. A variety of interesting plants native to various parts of the world will be observed and discussed with emphasis on their structure, growth requirements, propagation and ecological role in the natural landscape. Laboratory activities include greenhouse projects and several field trips.

PREREQUISITES: Grade of “C” or higher in MATH 012, MATH 015 or satisfactory completion of College's foundational studies requirement in computation and READ 095 or satisfactory completion of College's foundational studies requirement in reading, and ENGL 095 or satisfactory completion of College's foundational studies requirement in writing

PREREQUISITES OR COREQUISITES:

COREQUISITES:

CREDITS: 4

LECTURE HOURS: 3

LAB/STUDIO HOURS: 2

REQUIRED MATERIALS:

ADDITIONAL TIME REQUIREMENTS:

(Identify open lab or other lab requirements)

To visit one or more garden centers or shops which sell a variety of materials you may need to take proper care of houseplants, tend the garden or improve lawns and landscape plantings.

COURSE LEARNING OUTCOMES:

- Examine the gross and microscopic anatomy of roots, stems, leaves, flowers, fruits and seeds and understand the relationship between the various structures.
- Demonstrate comprehension of the relationship between different types of plants and how they are adapted to succeed in different biomes found in the United States.
- Identify, comprehend and compare the benefits, potential hazards and cost of horticultural supplies used by home gardeners.

GRADING STANDARD:

A student must have an average of 65% or better for the classroom component and an average of 65% or better for the laboratory component of the course in order to earn a passing grade for the course.

Upon completion of the course, grades will be assigned as follows:

A = 92 – 100%

A- = 89 - 91%

B+ = 86 - 88%

B = 82 - 85%

B- = 79 - 81%

C+ = 76 - 78%

C = 70 - 75%

D = 65 - 69%

F = <65%

Unit examination results will be reported as the grade assigned by the faculty calculated to the first decimal place. These grades will be weighed according to course grading policy. In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.

A grade of C or better is required in all pre-requisite courses. Career studies courses must have a grade of C or better to count toward the Mathematics / Science Program – Biology Option.

Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam and/or one laboratory practical. The granting of an Incomplete is at the discretion of the instructor.

COURSE CONTENT:

- Unit One: Cellular Basis of Life
- Unit Two: Plant Organs – Roots, Stems and Leaves
- Unit Three: Plant Reproduction, Propagation and Biotechnology
- Unit Four: Investigating the Plant Environment
- Unit Five: Plant Diversity
- Unit Six: North America as a Plant Environment

DEPARTMENT POLICIES:

COLLEGE POLICIES:

For information regarding:

- ◆ Brookdale’s Academic Integrity Code
- ◆ Student Conduct Code
- ◆ Student Grade Appeal Process

Please refer to the **STUDENT HANDBOOK AND BCC CATALOG.**

NOTIFICATION FOR STUDENTS WITH DISABILITIES:

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 or 732-842-4211 (TTY), provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

ADDITIONAL SUPPORT/LABS:

Course Website:

***Biology Department information and BIOL 125 resources are available on the Brookdale website:
<https://www.brookdalecc.edu/stem-institute/biology/>***

BIOL-125
Course Number

Introduction to Plants
Title

#1 of 6 Units

4 Credits

Name of Unit: Cellular Basis of Life

Unit Objective: Identify and describe the structure and function of plant cells, organelles and tissues in order to better understand and appreciate the complexity of plant life and how plants react to change in their environment.

Method of evaluation: Written Quiz, Written Test and Laboratory Practical

Estimated Time to Achieve: 2 weeks

Learning Objectives	Recommended Learning Experiences
---------------------	----------------------------------

The student will be able to:

1. Demonstrate effective usage of both the compound and dissecting microscopes in the observation and identification of plant cells, tissues and organs.

Attend scheduled class and take notes.
Complete lab 1.

2. Identify the following parts of a typical plant cell using a compound microscope, electron photomicrographs or a cell model.

Attend scheduled class and take lecture notes.
Participate in class discussion
Complete lab 2
Read Chapter 3 in your textbook , Introductory Plant Biology

- a. primary and secondary cell walls
- b. middle lamella
- c. plasma membrane
- d. central vacuole
- e. mitochondria
- f. endoplasmic reticulum (rough & smooth)
- g. ribosomes
- h. dictyosomes
- i. chloroplasts
- j. leucoplasts
- k. chromoplasts
- l. microtubules/microfilaments
- m. nucleolus

- n. nuclear membrane
- o. chromosomes (chromatin)

BIOL-125
Course Number

Introduction to Plants
Title

#1 of 6 Units

Learning Objectives	Recommended Learning Experiences
3. State the function(s) of the structural components listed in Objective #2.	Read Chapter 3 in your textbook. Take notes during class
4. Summarize the major events of photosynthesis and cellular respiration to gain an appreciation of how green plants produce and utilize chemical energy to maintain life. Write the summary equation for each process.	Attend class and take lecture notes Refer to Chapter 10 Study Table 10.2 on page 186
5. Trace the sequence of events that occur during the stages of the Cell Cycle beginning and ending with Interphase (G ₁).	Read Chapter 3 (pages 44-48) Attend class and take lecture notes
6. Identify, using prepared microscope slides, photographs and models, the stages of mitosis including Prophase, Metaphase, Anaphase and Telophase.	Study lab models and complete lab
7. Define mitosis and state the significance of the process to the reproduction, growth and repair of plants and plant tissues; be able to identify the sites where mitosis occurs to promote primary and secondary growth.	Attend class and take lecture notes
8. List, describe and identify meristematic and non-meristematic tissues found in flowering plants.	Read and outline the information in Chapter 4 of your text. Attend class and take lecture notes Study the photographs of tissue types in Chapter 4

BIOL-125
Course Number

Introduction to Plants
Title

#2 of 6 Units

4 Credits

Name of Unit: Plant Organs – Roots, Stems and Leaves

Unit Objective: Identify and describe the individual and collective functions of tissues found in the roots, stems and leaves of flowering plants. Identify and describe common types of specialized roots, stems and leaves of flowering plants as adaptations to aid survival or reproduction.

Method of evaluation: Written Quiz, Written Test and Laboratory Practical

Estimated Time to Achieve: 3 weeks

Learning Objectives	Recommended Learning Experiences
---------------------	----------------------------------

The student will be able to

1. Compare and contrast monocot and dicot flowering plants on the basis of their root, stem, leaf, flower and seed morphology using laboratory models, prepared microscope slides and live specimens.

Attend class and take lecture notes.
Study diagrams comparing monocot and dicot plant structures.

2. Identify and describe the structure and function of various root types; identify root tissues and describe their function(s) using laboratory models, microscope slides and plant material.

Read Chapter 5 in your textbook.
Complete Lab 16
Study models and materials on display in the laboratory
Attend class and take lecture notes

- a. epidermis
- b. xylem (vessels and tracheids)
- c. phloem (sieve tubes and companion cells)
- d. pericycle
- e. endodermis
- f. stele (area)
- g. parenchyma
- h. cortex and pith (areas)

- i. root hairs
- j. fibrous vs. tap roots

BIOL-125
Course Number

Introduction to Plants
Title

#2 of 6 Units

Learning Objectives	Recommended Learning Experiences
<p>3. Describe and give examples of various types of specialized roots.</p>	<p>Attend class and take lecture notes Study diagrams in Chapter 5 Observe materials on display in the laboratory or greenhouse</p>
<p>4. Identify, using models, diagrams, plant material and prepared slides, the tissues or structures found on or within the stems of herbaceous or woody plants. State the function of each structure or tissue.</p> <ul style="list-style-type: none"> a. epidermis b. cork (bark) c. cork cambium d. cortex e. pith f. vascular cambium g. xylem (vessels and tracheids) h. phloem (sieve tubes and companion cells) i. vascular rays (xylem and phloem rays) j. parenchyma k. sclerenchyma l. collenchyma m. vascular bundles n. axillary and terminal buds o. leaf and vascular bundle scars p. lenticels q. heart and sapwood in mature woody stems 	<p>Read Chapter 6 in your textbook Attend class and take lecture notes Complete Laboratory 5 and 15 Compare woody twigs in winter and summer condition (text Fig 6.1 on page 86)</p>
<p>5. Identify, describe and give examples of various types of specialized stems.</p>	<p>Study diagrams in Chapter 6 Attend class and take lecture notes Complete scheduled closed lab assignments</p>

BIOL-125
Course Number

Introduction to Plants
Title

#2 of 6 Units

Learning Objectives	Recommended Learning Experiences
6. Compare and contrast the structure and function of monocot and dicot leaves; identify, describe and give examples of simple and compound dicot leaves.	Read Chapter 7 in your textbook Attend class and take lecture notes Complete assigned lab activities
7. Identify, using diagrams or prepared slides, the following leaf tissues or secretions; state the function(s) of each <ol style="list-style-type: none">epidermis and epidermal hairscuticlexylem (vessels and tracheids)phloem (sieve tubes and companion cells)stomaguard cellspalisade mesophyll (parenchyma)spongy mesophyll (parenchyma)sclerenchyma (fibers or sclerids)veins	Read Chapter 7 in your textbook Attend class and take lecture notes Complete Lab 6 Study models, microscope slides and materials on display in the lab
8. Apply knowledge of plant tissues to describe the cooperative functions and interactions of roots, stems and leaves.	Attend class and participate in discussion; take notes

BIOL-125
Course Number

Introduction to Plants
Title

#3 of 6 Units

4 Credits

Name of Unit: Plant Reproduction, Propagation and Biotechnology

Unit Objective: Discuss the importance and historical significance of flowering plants to human civilization. Identify structures and trace the life cycle of a flowering plant from one generation to the next. Describe and employ successful asexual, including plant biotechnology methods and sexual plant propagation techniques

Method of evaluation: Written Quiz, Written Test and Laboratory Practical

Estimated Time to Achieve: 2 ½ weeks

Learning Objectives	Recommended Learning Experiences
The student will be able to:	
1. Identify the major parts of typical monocot and dicot flowers using live materials, prepared microscope slides, models and diagrams; state the function of each part discussed in class or lab.	Attend class and take lecture notes Read Chapter 8 in your textbook Study lab models Complete Lab 19
2. Diagram and describe the life cycle of a typical flowering plant using the alternation of generations concept.	Study the alternation of generations for the flowering plant life cycle Attend class and take lecture notes Study information in Chapter 8 and pages 432 – 435.
3. Investigate and discuss the relationship between flowering plants and civilization	Read Chapter 24 in your textbook
4. Identify and list the function(s) of seed parts and seedlings of representative monocot and dicot plants.	Attend class and take lecture notes Read Chapter 8 in your textbook Study models on display in the lab Complete Lab Exercises 20 and 21

BIOL-125
Course Number

Introduction to Plants
Title

#3 of 6 Units

Learning Objectives	Recommended Learning Experiences
5. Identify and describe examples of simple flowers, inflorescence types, fleshy fruits and dry fruits.	Attend class and take lecture notes Observe and study examples of flower and fruit types on display in the laboratory or greenhouse.
6. List and describe the function and importance of five types of plant hormones found in flowering plants	Attend class and take lecture notes Read Chapter 11 in your textbook Observe demonstration on effect of plant hormones on plant growth and development
7. Describe basic plant biotechnology techniques and state their significance in plant propagation and improving the quality of life for mankind.	Attend class and take lecture notes Read Chapter 11 in your textbook Observe demonstration on effect of plant hormones on plant growth and development
8. Describe the vegetative propagation techniques used by horticulturists to asexually reproduce plant material in the greenhouse or garden.	Attend class and take lecture notes Read Chapter 14 Propagate selected plants in the greenhouse under the supervision of your Biology Learning Assistant Complete Lab
9. Grow selected plants from seed and demonstrate proper transplanting and plant care techniques.	Observe laboratory demonstration on seeding and transplanting techniques Germinate seeds and record observations of plant growth in the greenhouse Complete Lab 21

BIOL-125
Course Number

Introduction to Plants
Title

#4 of 6 Units

4 Credits

Name of Unit: Investigating the Plant Environment

Unit Objective: Identify and discuss the factors that influence the growth and continued healthy state of plants with emphasis on greenhouse and garden plants

Method of evaluation: Written Quiz, Written Test and Laboratory Practical

Estimated Time to Achieve: 2 ½ weeks

Learning Objectives	Recommended Learning Experiences
---------------------	----------------------------------

The student will be able to:

1. Discuss the overall effect of the following physical factors on the growth and continued healthy condition of greenhouse and garden plants:

Attend class and take lecture notes
Read pages 77 – 82 in your textbook
Read Appendix 4 (beginning on page 562) Houseplants and Home Gardening in your textbook
Review pages 150 -162 and 168 – 169

2. List and describe the structure and composition of various garden and artificial (commercial mixes) soils. Compare their ability to hold water, provide nutrients to plant roots and potential for causing insect and disease problems.

Attend class and take lecture notes
Observe samples of garden and artificial soils or coarse aggregates including sand, perlite and vermiculite
Complete assigned lab activities

For additional information, refer to the following:

Our Living Soil by Cook
Vegetation and Soils by Eyre
Introduction to Soils by Berger
Internet Web Sites on Gardening

BIOL-125
Course Number

Introduction to Plants
Title

#4 of 6 Units

Learning Objectives	Recommended Learning Experiences
<p>3. Discuss the following soil factors and the effects on plant growth and health:</p> <ul style="list-style-type: none">a. soil acidityb. soil temperaturec. soil aerationd. soil micro and macro organisms	<p>Attend class and take lecture notes Complete lab activity on soil pH, nitrogen, phosphorus and potassium content using a Sudbury Soil Test Kit</p>
<p>4. List and discuss the significance of nine important elements in plant nutrition; state the observable effects of mineral deficiency for each of these essential elements</p>	<p>Attend class and take lecture notes Study Table 9 on page 161 in textbook</p>
<p>5. Using your knowledge of plant structure, trace the movement of water, dissolved minerals and organic compounds in vascular plants. Include the following terms</p> <ul style="list-style-type: none">a. root pressureb. transpiration pullc. cohesion and adhesiond. diffusione. osmosisf. active transportg. mass flow	<p>Review the structure of roots, stems and leaves with particular emphasis on the xylem and phloem tissue Read Chapter 9 (pages 150-160) in your textbook before class discussion on this objective Take notes on class discussion For additional information: <u>Introduction to Plant Physiology</u> by Bidwell</p>

BIOL-125
Course Number

Introduction to Plants
Title

#4 of 6 Units

Learning Objectives	Recommended Learning Experiences
---------------------	----------------------------------

6. Identify and describe remedies for the following plant pests and diseases:

- a. aphids
- b. white flies
- c. spider mites
- d. scales
- e. mealy bugs
- f. Japanese beetle grubs
- g. damping off fungus

Read Appendix 2 in your textbook
Study handout materials given out in class
Visit one or more garden centers to gather information to complete the Garden Center Project (submit to you instructor 3 weeks prior to the completion of a 15 week semester)
Attend class and take lecture notes

For additional information:
How to Control Plant Diseases by Shurtleff
General and Applied Entomology by Litt
Introduction to Mycology by Alexopoulos
How to Know the Insects by Jaques

BIOL-125
Course Number

Introduction to Plants
Title

#5 of 6 Units

4 Credits

Name of Unit: Plant Diversity

Unit Objective: Recognize and describe representatives of various plant divisions with emphasis on distinguishing characteristics. Discuss the evolutionary trends enabling plants to be successful on land

Method of evaluation: Written Quiz

Estimated Time to Achieve: 1 week

Learning Objectives	Recommended Learning Experiences
---------------------	----------------------------------

The student will be able to:

- | | |
|--|---|
| 1. Discuss the basis and significance of the binomial system of plant classification. | Attend class and take lecture notes |
| 2. Using examples of economically important plants, compare and contrast the terms variety and cultivar. | Attend class and take lecture notes
Study handout on plant classification |
| 3. Recognize representatives of major taxonomic groups useful in horticulture-related businesses. | Review Chapter 24 in your textbook |
| 4. Identify representatives of economically important plant families. | Observe plants on display in the lab and greenhouse
Review Appendix 3 – Useful and Poisonous Plants in your textbook |
| 5. Use a dichotomous key to identify genus and species of common flowering plants or evergreens. | Complete take home assignment |

BIOL-125
Course Number

Introduction to Plants
Title

#6 of 6 Units

4 Credits

Name of Unit: North America as a Plant Environment

Unit Objective: Describe the factors which contribute to and determine biome types in North America. Discuss representative plant and animal species associated with these large geographical areas and how the environmental and biotic factors mesh to provide a habitat and niche for each species. Discuss and describe the steps of primary and secondary plant succession.

Method of evaluation: Written Quiz

Estimated Time to Achieve: 2 weeks

Learning Objectives	Recommended Learning Experiences
---------------------	----------------------------------

The student will be able to:

1. Define the term ecosystem and utilize the following terms or concepts to construct a brief description of the interdependence between life forms and their physical environment.

- a. producers
- b. primary level consumers
- c. secondary and tertiary level consumers
- d. decomposers
- e. abiotic factors (physical factors)
food chains and webs
- g. pyramids of mass, numbers and energy
- h. cycling of elements vs. flow of energy
- i. habitat vs. niche
- j. interspecific vs. intraspecific competition

Attend class and take lecture notes
Read Chapter 25 in your textbook

Learning Objectives	Recommended Learning Experiences
2. Define primary and secondary succession. Describe the stages of primary succession beginning with bare rock leading to a Deciduous Forest.	Attend class and take lecture notes For additional information: <u>Fundamental of Ecology</u> by Odum <u>Web of Life</u> by Storer <u>Basic Ecology</u> by Buchsbaum
3. Define the following terms: a. Xerosere b. Psammosere c. Hydrosere d. sere e. climax vegetation (species) f. lichens	Read Chapter 25 in your textbook Attend class and take lecture notes
4. Locate eight vegetation types (biomes) on a map of North America; list the dominant vegetation in each biome. Compare each biome with regard to annual temperature and rainfall patterns: a. Tundra b. Taiga (Evergreen Forest) c. Temperate Deciduous Forest d. Grassland e. Desert f. Mountain Forest g. Tropical Rain Forest h. Pacific Northwest	Read Chapter 26 in your textbook. Study the map of major biomes and compare to a road map of the U.S. Refer to Figure 26.1 on page 499 in your textbook Participate in campus field trip to observe climax species and factors influencing the Deciduous Forest Biome.
5. Discuss the effects of increased population and pollutants on the stability of our environment. Include consideration of pollutants and pesticides as factors which affect the quality of health and alter the environment in ways which we are only beginning to understand.	Class discussion

The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.